



A Drynet Science & Technology Expertise:

Assessing the potential of the indigenous livestock breeds of Baluchistan

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Abstract

Balochistan province comprises of arid and semi-arid lands (ASAL), makes about 44% of the total geographical area of the country. Only 5% is arable and the rest is rangelands. Livestock is one of the major important sectors, and housing about 20% of the national stock of Pakistan. Province is the cradle of many precious livestock breeds and play pivotal role in the socio-cultural and socioeconomic life of its inhabitants. Animal genetic resource provides a major source of livelihood and mean of utilization of marginal environments not suitable for cultivation. The Animal genetic resources are the building blocks for future livestock development that will enable livestock keepers to respond to changes in animal production circumstances and new consumers preferences. The livestock genetic diversity is the product of local environmental conditions combined with the breeding strategies of traditional communities. Interspecies biodiversity is the outcome of many different communities managing livestock in many different habitats and ecological zones. The ability of livestock to survive natural calamities (droughts, climatic extremes) is necessarily more important than high productivity. Also local livestock breeds are embodied with indigenous knowledge which is an important human resource for animal breeding and precious heritage for the inhabitants.

These precious and important livestock breeds, we have in hand are currently under threat and disappearing even before documentation. There are many reasons for this sad state of situation i.e. war and conflicts (some breeds are maintained on the basis of regular migration according to the season and foliage availability and the wars and conflicts minimize the herds movements), epidemic diseases, urbanization and cross breeding, changing livestock systems from subsistence (extensive) to commercial (intensive), lack of valuation of local breeds, increasing competition for natural resources, environmental degradation and global warming. Economic forces of globalization as well as political backing for crossbreeding with exotic breeds, among other factors, have already resulted in the disappearance of a large number of these breeds and many more are threatened globally. There is utmost need of time to characterize and document these breeds according to the perspectives of their own livestock keepers. Only the respective livestock keepers know the important traits of their animal genetic resources. This study was therefore, conducted to characterize and document the indigenous animal genetic resources in the livestock keepers' perspectives. A survey was conducted on the basis of the ecological zones and each zone with the relevant livestock breeds was discussed accordingly. A Performa was designed for each species and the relevant breeders were interviewed. The breeders were selected on the basis of the willingness, availability, indigenous knowledge, area of the breed and accessibility etc. Questions asked were mainly about the socioeconomic importance, breeding goals, breed features, special traits, marketing, population size and trend. The biometry was conducted with a tape meter of the mature animals of camel breed in the morning time when their bellies were empty. A color illustrated table was used as a standard for the name of the color of the breed and was further verified the color while in the group discussions with the herders in a feedback seminar. It was found that there are six ecological zones on the basis of livestock types, production systems and penology. In each zone there were camel, goat sheep but some ecological zones also have the donkey, horses and cattle. Camel is one of the important animals and is under threat in many ecological zones. The last drought had badly affected livestock production systems and some species like cattle and sheep were adversely influenced. The sheep and cattle population is again increasing in number. All the

livestock species have obtained high values and economic potentials as the prices of milk, meat and draft animals have increased many folds. It was concluded that value addition to livestock products, niche marketing and ecotourism can be the good tools for the livestock improvement and poverty reduction in such livestock production systems.

Keywords: Indigenous livestock breeds, livestock keepers, arid and semi arid lands, ecological zones, Balochistan, production systems and indigenous knowledge.

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1. Introduction

Pakistan in general, especially Balochistan province is the habitat of many indigenous pastoral people (Raziq, 2008a). Each tribe or community live in a specific habitat and keep very specialized breed of livestock, well adapted to that specific ecology and produce on the naturally available feed resources. Indigenous livestock breeds play pivotal role in the socioeconomic and socio-cultural life of the livestock keepers in Balochistan. The present day livestock breeds in the province were originated from the wild ancestors, and were subsequently shaped through the processes of natural & human selection. These breeds are the product of local environmental conditions combined with the breeding strategies of traditional communities. Interspecies biodiversity is the outcome of many different communities managing livestock in many different habitats and ecological niches, and manipulating its genetic composition according to the specific requirements of their environment, their production system and their own preferences or breeding goals. This has been the basis of the adaptation of indigenous livestock to highly diverse and challenging environments.

Breeding goals of tribal livestock breeders in the province are far more versatile than in intensive production systems and comprise many aspects other than high productivity with regard to cash products (meat, milk). The importance of the indigenous livestock breeds will be discussed in the ensuing line.

1.1. Multipurpose

Keeping multipurpose livestock is part of a survival strategy which people have developed to cope with extreme climatic and environmental conditions. In some areas, it is only livestock that enable people to exist, since the potential for growing crops is limited or non-existent. Although in extensive production systems hardiness and adaptability to extreme conditions have priority over production traits, local breeds can have a remarkably high production potential. One of the best examples is milk production potential of camel, which produce reasonable amount of milk in hostile and harsh environment of the province (Raziq et al 2008). Besides, its hardiness, adaptability and socio-cultural importance, indigenous livestock produce is also versatile and one species can fulfill many needs of the consumers. Table 1 indicates the produce of animal genetic resources in the province.

1.2. Hardiness

The local livestock breeds are hardy and resistant to drought, water shortage, lower or poor quality water (i.e. brackish and muddy etc), and disease tolerant. The breeders know the importance of relevant breed and can well define the characteristics and special traits. Local livestock breeds are well cope with the local ecology and ailments and each breed has his own special trait (table 2). Well-adapted local breeds that are widely kept without special feed concentrate or preventive health care are now increasingly recognized as being more productive than imported exotics. They thus form the most suitable foundation for sustainable livestock production in the province.

1.3. Source of Food and economic security

Maintaining a wide spectrum of local animal breeds is crucial to food security, poverty alleviation and sustainable development. The safeguarding of locally adapted livestock breeds is therefore very much in the interest of developing countries both for present and future food security. Rising incomes lead to rising demand for specialized foods generated by a diversification of animal production systems (Oldenbroek, 2007). They are of social benefit as “insurance” against natural disasters or economic bottlenecks.

1.4. Cultural and historical identity and indigenous knowledge

Local livestock breeds reflect the cultural and historical identity of the communities that developed them; therefore, conserving the breed is necessary to maintain their cultural identity. The livestock breeds are embedded in local knowledge (IK). Indigenous knowledge of animal breeding is made up of various concepts and practices used by livestock breeders to influence the genetic composition of their herds. It includes cultural concepts, local preferences for certain characteristics, selection for certain qualities, pedigree keeping, special traits etc.

1.5. Breeds are under threat

According to FAO, globally about 1000 of the 6400 recognized breeds have become extinct during the last 100 years. One-third of these died out between 1985 and 2000 (FAO, 2001). Reasons for the high extinction rate are manifold and interrelated. They include: the intensification and industrialization of agriculture and animal production; the large-scale promotion of uniform high-yielding breeds and crossbreeding; policies and developments that disadvantage ethnic minorities; conflicts and wars; natural disasters, inappropriate development aid focusing on short-term benefits and change in social systems. The following section elaborates on some of these issues.

In Balochistan the situation is not different. Many breeds and production systems are under threat especially camel and cattle. The cause for cattle is large-scale promotion of uniform high-yielding Holstein and crossbreeding of the indigenous cattle. The reason for the disappearing of camel breeds are the high smuggling rate of camel to Iran and Gulf countries. High slaughter rate of fertile/pregnant animals in the province, draughts, social changes and increasing deforestation etc

2. Objectives of the study

Livestock diversity in the province is currently shrinking with rapid and uncontrolled loss of unique and often uncharacterized animal genetic resource (AnGR). If a breed or population becomes extinct, this means the loss of its unique adaptive attributes, which are often under the control of many interacting genes, and are the results of complex interactions between the genotype and the environment. Genetic diversity should be conserved to maintain the flexibility of livestock systems and to sustain the further development of rural areas (Oldenbroek, 2007). There is an urgent need for the characterization of livestock breeds, types and population with respect to morphology, actual production levels and genetic differentiation (Wilson, 1997). The scientists have overlooked and may have unrecognized advantages and potential of the local livestock breeds. Indigenous knowledge of the animal breeders can provide an opportunity for identifying these breeds and their special qualities. The pastoral people know well the salient traits of a specific breed. So the breed

must be characterized in his or her own perspectives. Before going to characterize a breed the socioeconomic circumstances in which the breed exists must be documented (Köhler-Rollefson, 2005). Socioeconomic and ecological information of the habitat of that breed were reported and the physical characteristics, management & production systems and productivity were used for the documentation of the camel breed in India (Köhler-Rollefson and Rathore, 1996). A thorough assessment is necessary before the breed characterization. The breeders of those specific breeds are in a better position to tell the important traits. The socioeconomic data is also helpful for the appropriation of a breed for characterization (Simianer, 2002). The bases for characterization of a breed are judging, performance traits, adaptation traits, special traits like drought and disease tolerance and biomolecular studies (Grund, 2004).

3. Methodology/approaches

This study was conducted on the basis of the ecological zones of the province. A Performa was designed for each species and the relevant breeders were interviewed. For each breed, 20 farmers were asked individually and then a group discussion was accomplished. The breeders were selected on the basis of the willingness, availability, indigenous knowledge, area of the breed (true habitat of the breed) and accessibility etc. Questions asked were mainly about the socioeconomic importance, breeding goals, breed features, special traits, marketing and population size and trend.

The biometry (body parts measurements) was conducted with a tape meter of the mature animals of each breed in the morning time when their bellies were empty. No pregnant animal was included in this study. Each animal was measured within a limit of 10 minutes and the other person was writing the measurements. The animals were measured from the left side to keep the data homogenized. The animals were placed on a smooth place and were measured with a type measure. A color illustrated table of the paint company (ICI Pakistan LTD) was used as a standard for the name of the color of the breed and was further verified the color while in the group discussions in a feedback seminar with the herders.

4. Results and Discussion

4.1 Ecological zones of the province

The ecological zones already presented in the literature are based on the agronomic practices, temperature, rainfall etc. In the present study the ecological zones were sketched on the basis of the local penology, type and production systems of livestock, temperature, rainfall etc. It was revealed that there are six ecological zones for livestock rather than four revealed by literature (Source: National Master Agricultural Research Plan, Pakistan Agricultural Research Council).

The following ecological zones were revealed in the province. The map with the new ecological zones for livestock is presented in Fig.1.

4.1.1 Suleiman Mountainous Region (SMR)

This region includes Dera Bugti, Kohlu, Barkhan, part of Loralai and Zhob, Musakhail and Sherani districts of the province. The Suleiman mountain series is located south to north and bordering between Punjab and Balochistan province. The region has rich culture and is the historic homeland of Pashtoon. The climate of the region is mild in summer because of the high altitude and rains in monsoon time. The

temperature reaches to 32 C° in summer and drops below zero in winter. Some parts, especially the peaks of the mountains are very cold in winter. The annual precipitation ranges from 300-600 mm per year and the main source of rain is monsoon (GOB, 1999). Some areas receive snow and rains in winter also.

The SMR is the home tract of a wide plant biodiversity and the the vegetation of the region comprises trees like *Zizyphus nummolaria* (Karkana), *Ziz. mauritiana* (ber), *Z. sativa* (Helani), *Oleao ferruginea* (Showan), *Oleao officinalus* (showan), *pistacia cabulica* (wanna), *tamarix indica* (Ghaz), *Prunus eburnean* (Zarga, zangli badam) and *salvadora oleoides* (pilu or perpegh). Bushes of the regions are as fallowing. *Haloxylon recurvum* (Ghelmi), *nannorhops ritchieana* (Mazari or Pish), *Caragana ambigua* (makhie), *alhagi camelorum*, (Aghzai or Tindan) and *periploca aphylla* (Barar). The grasses include *stipa capillata* (Saba), *cocculus leæba* (Parwatgi), *sorghum halepense* (Barawa), *allium sphærocephalum* (khokhae) and *Atriplex canescens* (sargaræ). Livestock agriculture is the centuries old occupation of the inhabitants. The region has wide biodiversity of livestock species and breeds. The major livestock breeds are as following.

Camel; Kohi, cattle; Kohi-Suleiman or Lohani, donkey; Shinghari and Sperki or Pidie, horse; Balochi, sheep; Kakari, Musakhaili, Kajjale and Bybrik and goat; Kohi Suleimani. The tribes of the region are Kakar, Sherani, Mandokhail, Babar, Harifal, Musakhail, Zamari, Marghzani, Essot, Jaffar, Buzdar, Syed, Kethran, Hasni, Mari, Zarkoon and Bugti.

4.1.2 Northern highlands (NHL)

This region includes hitoric Kakar Khurasan, Loralai, Zirat, Zhob, Pishin, Qillaabdullah and Quetta vallies. The region falls in the north of the province bordering Afghanistan. The area has very cold winter usually dry. The summers had been mild but some herders beleive that the temperature has been increased during the last few years. This region is severely affected and the rangelands are degraded due to many reasons, i.e. influx of Afghan Migrants, over population, deforestation and the long prevailed drought (1994-2004). The climate of the region is mild in summer because of the high altitude and some eastern part of the region receives rains in monsoon time. The temperature reaches to 30 C° in summer and drops below zero in winter. The region is the coldest region of the province. The annual precipitation ranges from 250-600 mm per anum and mostly receives in winter in form of snow (GOB, 1999).

the major vegetation of the region comprises trees like *Zizyphus nummolaria*, *Oleao ferruginea*, *Oleao officinalus*, *pistacia cabulica*, *Prunus eburnean*, *Tamarax aphylla*, *Juniporis excels* and *Pinus Geranandiana*. The bushes are the major feed of camel and comprises of *Haloxylon recurvum*, *nannorhops ritchieana*, *Caragana ambigua*, *alhagi camelorum*, and *periploca aphylla*. The grasses include *stipa capillata*, *cocculus leæba*, *sorghum halepense*, *allium sphærocephalum*, and *Atriplex canescens*. The region has wide livestock biodiversity of livestock species and breeds. The major livestock breeds are, camel; Raigi, cattle; Kohi Suleimani, donkey; Shinghari and Sperki or Pidie, sheep; Kakari, Dumeri or Hernai, Gosalli or Kajalle, and goat; Khurasani and Kohi Suleimani. The tribes of the region are Kakar, Pani, Achakzai, Tareen, Syed, Ghilzai, and Barraich.

4.1.3 Central Brahvi Highlands (CBH)

This region comprises Mastung, Kalat, Khuzdar, mountainous part of Dhadar and Awaran districts of Balochistan province. The region is characterized by high and arid mountains with very hot summers and very cold winters. The temperature may reach to 49 C° in summer and fall below zero

in winter. The rainfall of the region is low and erratic (100-200 mm per year) (GOB, 1999). The vegetation of the region consists of *Tamarix*, *Halloxylon grifithii*, *Alhaji camelorum*, *Sacharum revanae*, *Chrysopogon aucheri*, *C. mantanus*, *C. schoenanthus*, *Cenchrus ciliaris* and *Pannisetum orientale*. The livestock breeds of the region are Brahvi camel, Mangeli sheep and Lehri goat. The tribes of the region are Maingul, Samalani, Zehri, Raesani, Bangulzai, Lehri, Rakhshani, Bezenjo, Bajoi, Lango, Muhammad Shahi, Dehwar, Kurd, shahwani, Gichki, Mirwani, Muhammad Hasani and Gurgnari.

4.1.4 Kachhi Basin Region

This region comprises of Sibi, part of Dhadar, Jaffarabad, Naseerabad, Lehri and Jhal Magsi locale of the province. The region is plain area, formed of alluvial soil and slopes from north to south with an elevation of about 50 to 100 meters above sea level. The climate of the region is hot and becomes extremely hot and humid in summer. The harshness of summer is prolonged over the months of May, June, July, August, September, and October. It is mildly hot in April. Summer begins from mid March and lasts to the end of October. In winters the weather is pleasant all over the district. It lasts from December to January. The months of April, November and February are pleasant. The humidity is highest in summer, particularly in the area adjacent to the Pat feeder canal, where rice cultivation takes place. The type of vegetation in the region includes *Spicigra* (Kandi), *Capparis Aphylla* (Kirar), *Salvadora Olevides* (Khabbar), *Sisyrhus jujuba* (Bari) and *Calotropis Gi Gantea* (Ak). The breeds of livestock are the famous Bhagnari cattle, Berberi goat, Balochi sheep and Aseel chicken. The tribes of the region, in the north there are Pani and Kakar Pashtoon tribes and in the south is Rind, Lehri, Somro, Bugti, Mari, Khoso, Jamali, Jatoli and Resai.

4.1.5 Chaghai Kharan Desert (CKD)

Chaghai Kharan is one of the famous ecological zones of the country and comprises of the districts Chaghai, Kharan, Noshki, Washuk and part of Makran. The region is unique of its kind and mostly comprised of disserted plains, steppe and mountainous desert. The region is located in the extreme west of Pakistan bound on the north by the desert region (Raig) of Afghanistan. The region is hyper dry and receives very less precipitation in winter and spring from the Mediterranean winds and very rare rains in the summer. The temperature of the region crosses the digit of 40 in the months of June, July and August. The summers are very hotter with minimum rainfall, which worsen the situation more. The region is home tract of many herbal plants and bushes which are being use for grazing of livestock especially camel and goat since unknown times. The speedy deforestation of those bushes, long drought and over grazing had adverse the condition of the region and its ecological landscape diversity is under threat.

The major vegetation includes tree species like Khanjak, (*Pistecia Khanjak*), Ghaz (*Tamarix Articula*), shrub like Taghaz (*Haloxylon Amodendron*), bushes like Hashwarg (*Rhozya Stricta*), Pog (*Calegnum Polygonoides*) Cotor (*Stockcia Brohinca*), Lara (*Salsola Kali*), Kandar (*Alhagi Camelarum*), Barshonk, Karwankush, Narronk (*Salsola Arbuscula*), Tusso (*Gaillaina Aucheri*) and grasses like Mughair (*Atriplex Dimprphostegium*), Kash (*Sacchorum Siliare*), Righith (*Suoeda Monica*) Shanaluk (*Allium Rubellum*). The breeds of the region are Kharani camel, Khurasani and Morak goat and Rakhshani sheep. The tribes of the region are Badeni, Muhammad Hasani, Maingul, Jamaldini, Sasoli, Sanjrai, Nothezi, Nausherwani, Malangzai, Siafad, Faqirzai and Hajizai.

4.1.6 Balochistan Coastal Region (BCR)

The region is comprised of Lasbella and Makran locale of the region. The climate of the region is hot and humid. The temperature reaches to 40 °C in summer and reaches to 6 °C in winter. The annual rainfall is very low and precipitates about 125 mm per year.

The extensive plains have vast area of sparse vegetation which includes plants species like *Salsola* sp., *Panicum antidotale*, *Alerupus repens*, *A. macrstachyus*, *Cnechrus ciliaris*, *C. pennisetiformis*, *C. religerus*, *C. biflrus* besides there are *Prosopis cineraria*, *Salvadora oleoides*, *Capparis aphylla*, *Zizyphus* sp and *Prosopis juliflora*. The breeds of the region are Lassi camel and Balochi sheep. The tribes of the region are Lassi, Bizenjo, Jam, Somro, Khoso and Jamali.

4.2 Indigenous livestock breeds of the region

There are many livestock species which are well adapted to the climatic conditions and produce in a much input livestock production models. In this study the breeds are characterized and documented which are never discussed and document earlier by scientists. More emphasis is given to camel which is the most neglected species in the country especially Balochistan. The breeds of the province will be discussed in the following topics.

In this study 6 camel breed, 7 sheep breed, 4 goat breeds, 1 cattle breed and 2 donkey breeds were characterized and documented according to the perspectives of the pastoral people.

4.2.1. Camel

Camel is the precious and important animal of the province. Camel is the most well adapted livestock specie, survives and produces in climatic extremes and is well appreciated for its' significance in the pastoral economy of the province (Raziq and Younas, 2006; Köhler-Rollefson, 2005). The camel being an important livestock species uniquely adapted to hot and arid environments (Schwartz, 1992), like in Balochistan, and therefore contributes significantly to the food security of the nomadic pastoral households. No doubt the automobile and machine transportation decreased its draught role, but it is still an important food animal and indigenous animal genetic resource. Camel is a hardy animal and has proved his worth in the long prevailing droughts in Balochistan, remained almost for 10 years (1994-2004). The Relief Commissioner's data and other reports indicated that the draught has caused great damage to livestock sector but a lesser number of camels was affected as compare to other livestock species proportionally (Ali et al, 2004; Shafiq and Kakar, 2007; Ahmad et al, 2004). But unfortunately, less attention has been given to camel improvements for many years when planning national development. The breeds of camel will be discussed in the ensuing paragraphs. There are 6 camel breeds in the province, most of them were never characterized, documented, or discussed in the grey record of the country.

I Brahvi

The Brahvi camel is well adapted to arid, cold and mountainous ecology of central Brahvi highlands (CBH) of the province (Figure 2). Some herds of this breed may also found in northern

parts of Sind province. Brahvi camel herders also migrate to the Kachhi basin region of the province in winter. So, the breed is also found in that area in winter.

Production systems and socioeconomic importance

The main production system of Brahvi breed is transhumant, the system in which the pastoral people move with their livestock according to the agriculture operations and foliage availability. Some of the camel herders of the region move with their camel on fix routes and fix time of the year. Such system is nomadic, the pastoral people of this production system reach to the north part of Sindh province and some to the Kachhi basin in winter. Very rare camel herders practice sedentary way of production. Only male camels for work are reared in sedentary way.

Brahvi camel is important for the socioeconomic life of the herders of central Brahvi highlands. It provides draught power for family shifting, agriculture operations and other uses. Though Brahvi camel produce lesser amount of milk compare to other breeds of the province but still provide milk for family use in dry period when the vegetation is not available and goat and sheep milk ceased. The wool is use for making rugs and tents. Usually the herders do not slaughter the camel but only sick and injured one. The camel catches high prices because of the smuggling to Iran but this sort of business is also a threat to the camel because of the slaughter of female fertile animals.

Population size and trend

Population size of the camel ranges from 5,000 to 7,000. The number of this breed is going downward. The main threats to the breed are the removal of vegetation cover, change in agronomic practices, social changes and illegal smuggling to Iran.

Breeding goal

The major breeding goal of the Brahvi camel herders is to produce camel with good bagging and packing ability and adapted to cold mountainous ecology of its habitat. The male is selected for breeding and the one with coarse and dense woolly coat, deep brown darkish color and wide chest is always preferred. The male with vigorous body, round hard foot and wide cannon bone is the choice of the breeders.

Special traits

The major special traits the breeders know are as following

- ❖ Well adaptation to arid and cold environment.
- ❖ Withstand water scarcity more than other breeds of camel (two weeks).
- ❖ Good in learning commands of the owner (Dlair)

Phenotypic characteristics

Brahvi camel is smaller in size with comparatively shorter legs, but has wide chest making it suitable animal for work in mountains. The Brahvi camel have great density of long woolly coat which is so dense that it is difficult to pass finger through it. The hind quarter is massive and strong. The body color is dark to fawn. But grey color with some specimen of white color is also found. The salient body measurements are given in **table 3**.

Reproductive and productive performance

The maturity in male and female is 4 and 3 years respectively. One bull camel is sufficient to breed 50 cow camels. The service period is 6 days and estrus cycle ranging from 1-4 weeks. The

conceived she camel changes her behavior at 6th day of service and show a different behavior as erecting her tail when an animal or a person come near to her. Calving interval is normally two years, depending upon the availability of foliage and lactation length. Average reproductive life of a female is about 20 years. Conception rate of camel is higher with appreciable calving percentage and rare abortion. The salient features of the breed area given in table 4.

Marketing and future economic potential

In the present marketing scenario, the camel is mostly shifted to Iran by illegal mean. The camel catches high prices there and the meat is highly preferred over there. As the camel produce lesser amount of milk, hence not fit for future milk industry. The future of the camel is very bright for its delicious juicy meat.

II Jathnasal or Raidi

The habitat of Raidi breed is Kachhi basin ecological zone of the province. This breed is belonging to the mobile indigenous people of Jath community. The breeding herds of Jathnasal breed are usually community owned and they share profit on the community basis. Jath community has very strongly woven and has a very effective social system. Jathnasal breed is mainly use for the earning of livelihood. They use the camel for family needs and camel milk is the major and only protein source for the community. They either sell the male animal which is mainly use for carting in major cities, or use male animal for draft work and earn money. They use male and female camel both for luggage transportation with their families. The Jathnasal breed is presented in figure 3.

Production systems and socioeconomic importance

The Jath community, according to their elders originated from the Great Indian Desert. They travelled with their camel in search of foliage for their camel and reach to the plains of South Balochistan (Kachhi basin). They had served the camel caravan of the pilgrim going to Makka and coming back to the Indian subcontinent. Actually the Jath settled some 300 years back in this region. They came in the region with the Brela camel breed of Cholistan area from Southern Punjab. The Pat region of Balochistan was then the cross road from India to Arabia. The pilgrims were using camel for transportation and the disabled and wounded animal were being kept with the Jath community, while replacing them with energetic and healthy animals. From time to time the camel of Brela was then crossed with many breeds of the sub-continent and new breed came in being. Jaths have their own values and they never slaughter camel. They use camel milk for food and rarely eat flash.

They travel round the year from Jhal Magsi area of the region and travel up to the Bolan hills. They start their movement from Jhal Magsi and surrounding areas of Sind after grazing the aftermath of wheat crops and move towards the north to Bolan hills. They travel in a very wide area with very organized way. This camel belongs to the old indigenous people of Jath community and each tribe has their own sign of identification. They don't keep any other animal except camel but Asseel bird as a game bird.

Population size and trend

This breed of camel has one of the largest camel populations of the province. The population size reaches from 60,000-70,000. The trend of the camel is stable and there is apparently no threat to the breed. Although, limiting grazing lands because of deforestation and introduction of the canal irrigation in the habitat are the hazards to this breed of camel.

Breeding goal

The breeding goals of the breeders are to produce large sized camel fit for long traveling and tolerant to the high ambient temperature of the region. They select the vigorous male with large body size, long legs and neck. The Jath do not consider the color of the breed. They also select the animal for long teats and more milk production to provide sufficient amount of milk to the new born and also for family. They also select the male with hard foot pad, to resist the spines of musket plant which is predominantly found in the region.

Special traits

- ❖ Loyalty to the owner (*Dalair*)
- ❖ Resistant to extreme hot weather of the region (up to 52 °C)
- ❖ Resistant to diseases especially, pox and orf
- ❖ Multi-characteristic because of the blood of many breeds
- ❖ Resistant to foot rot because of the spine of musket

Phenotypic characteristics

The Jathnasal breed is highly diversified, having the blood of many breeds, i.e. Breela, Kohi, Sindhi, Marrecha, Thari or Sindh Desi and many other breeds. The color pattern is also diversified and there are many colors, i.e. Black (Sawan), white (Aspaid), fawn (Sorebore), deep brown (Boor) and red (Lal) colors. The size of the breed is one of the largest in the province; the phenotypic characteristics are presented in table 5 and figure 3.

Reproductive and productive performance

Breeding season of this breed is December to January. Male is ready for breeding at the 4 years of age and female reaches to the time of mating at the age of 4 years. About 40 she camels are normally bred by one bull camel. While the service period remains for 6 days and estrus cycle ranging from one week to 4 week. Calving interval is normally two years, depending upon the availability of foliage and lactation length. Average reproductive life of a female is about 25 years. The details are presented in table 6.

Marketing and future economic potential

The camel of Jathnasal breed catches very high prices from the camel carters of the towns and large cities of Sindh. The healthy male animal with good body figures catches a price up to 90, 000 Rupees. The camel herders do not sell the female animals. Jath community do not sell their fertile female camels, because the camel is the only source of earning and they have no lands for cultivation. The milk is use to offer to the newborn s and family use also. The Jath community rely on the camel milk and they like it very much.

III Kharani camel

Kharani camel is found in the desert ecosystem of the Chaghai Kharan desert ecological zone. Kharani camel is one of the important camel breed, well adapted to desert ecosystem and play pivotal role in the socioeconomic and socio-cultural life of the pastoral people of that region. The breed has very deep roots in the culture of the Baloch tribes.

Production systems and socioeconomic importance

The majority of the herds of camel are owned by nomadic and semi-nomadic herders. In winter time the nomadic and semi-nomadic owners migrate towards the east, up to Bolan area of the province. After the rainy season of monsoon in July and August, abundant vegetation is available there. The small stockers are mostly sedentary owners provide supplementation in the winter season because of the low or even no vegetation availability in the region.

Kharani camel is one of the best milk producers in the world and produce up to 40 liter of milk per day. The milk is widely used in the region and therefore having high consumer preference. The milk is being used fresh, soured (Sorain) and added in tea. Sorain is highly preferred and can be store for up to one week without refrigeration. The same methodology is use in the countries of Central Asia and the product is known as camel Vodka locally.

Population size and trend

The population size estimated ranges from 9000 to 13000 and there is a speedy decline in the population. There are many factors responsible for this sad stat of situation, i.e. illegal export to Iran both male and female animals, threat to the ecosystem of Kharani breed because of the deforestation and some herders now practice cross breeding to produce Rodbari camel which is a good race animal in desert. Such cross bred animal is highly liked by the smugglers which is being use for drug trafficking in the triangle of Pakistan, Afghanistan and Iran.

Breeding goal of the breed

The main breeding goal of the Kharani camel breeders is to produce camel with high milk yield. The second major breeding goal is to produce camel well adapted to the desert ecosystem. The male camel is selected for breeding with the characteristics of higher milk, adaptation in the desert ecosystem, boor or fawn color. Curly wool and hanging muzzle. The camel is medium in size with long black eye lashes. Long legs, neck and oval foot pads are the salient feature of the breed. There are two special traits of the breed, i.e. milk production ability, drought resistant and hardy against the high ambient temperature of the deserted ecosystem.

Special traits of the breed

- ❖ High milk yield in the hostile desert conditions
- ❖ Resistant to trypanosomiasis.
- ❖ Highly drought tolerant

Phenotypic characteristics

Except some non-descript camel majority of the camel population is composed of the Kharani breed. The name of this breed is derived from the famous Kharan desert. This breed is also called as Boor locally because of its colour (Fawn) as presented in figure 4. There are many color patterns in the Kharani camel. The pastoral people know the importance of the color of a breed and correlate it with the specific trait. The colors are fawn, red brown, white and yellow. Phenotypic characteristics are given in table 7.

Reproductive and productive performance

Male is ready for breeding at the 4 years of age and female reaches to the time of mating at the age of 2.5-3 years. While the service period remains for 6 days and estrus cycle ranging from one week to 4 week. Calving interval is normally two years and average reproductive life of a female is about 20 years. Weight of the calf at the birth is almost 30-40 kg, depending upon the sex, nutritional and health status of the dam. Weaning weight at (12 month) is about 165-180 kg. The reproductive performance of the Kharani camel is presented in **table 10**.

Marketing and future economic potential

The respondents stated that the animals are sold in the local market of the town and rarely sell locally. The owners are really wise and had almost eliminated the role of middle man. Though, the town merchant and butcher don't pay good prices to the owners. Some smugglers buy local livestock at cheap prices and smuggle it to Iran and earn handsome money. The high milk yield is one of the best economic potential of this breed.

IV Kohi

Kohi camel is predominantly found in Suleiman mountainous region of Balochistan, Pashtoonkhua and Punjab provinces of the country. Some specimens are also found in the Paktia province of Afghanistan. But 70% of the breed is found in the Balochistan province (Fig. 5).

Production systems and socioeconomic importance

There are three major camel production systems in this region viz; nomadic, transhumant or semi-nomadic and sedentary. Socio-economic importance of camel is closely associated with existed production systems. These systems are largely determined by climatic conditions, topography of the land, plant growth penology, water sources, etc (Aujla et al, 1998). As the camels are always on move, they hardly spend more than one month at one place.

The Kohi camel play pivotal role in the socioeconomic activities of the region. It is used in the high mountains of Suleiman mountainous series for the transportation of various items. The animal is well fit for work in that hilly land and the broad wide cannon bone make it well to do in that habitat. (Raziq and Younas, 2007). Camel is also use for the pastoral migration and milk production.

Mangrota camel fair is one of the largest camel's socioeconomic and cultural activities of the camel herders of Kohi breed. The herders manage camel movement and migration pattern according to the onset of the Fair (Raziq, 2008b)

Population size and trend

The Kohi camel breed is one of the major camel breeds in the country. This breed is found in the other provinces of the country also. The estimated number of this breed in Balochistan province is almost 70,000 head. This breed still has the importance for transportation and milk is the byproducts, nevertheless it produces an average of 10 liters of milk per day. The breed is growing and there is no threat to the population of Kohi camel, though the ecosystem of the breed is under threat.

Breeding goal of the breed

One of the major breeding goals is the production of vigorous and compact animal for work in the mountainous region. The breeders select usually male camel and there is no choice for female. All the females are being bred, as the breeders believe that male animal play role in the breeding of the camel. Milk production is the second major breeding goal, because more milk is the security for the healthier calves and ultimately production of vigorous camel. The other traits of selection are the white color, beautiful muzzle, curly wool, strong wide cannon bone and wide chest.

Special traits of the breed

- ❖ Compact body, strong hind quarter, wide cannon bones and strong foot pad making it specially fit for mountainous ecology
- ❖ Survival in cold weather without housing
- ❖ Browsing in small area when vegetation is available (easy care and accessible)
- ❖ White nails and yellowish eye color
- ❖ More weight per unite body area (Compact)
- ❖ Highly resistant to diseases, locally called as ***syed***
- ❖ Its white color is phenotypic marker for more milk yield
- ❖ The animal is very loyal and loving to the owners

Phenotypic characteristics

The Kohi camel is predominantly white in coat color but some animals locally known as Spole color (light brown with white legs) are also found. The Kohi camel has white nailed either it is white or Spole coat color. The animal has compact body, wide cannon bone, big beefy head and short neck. The herders believe that the white color of Kohi camel produce more milk than Spole (brown body white forelegs) animal and a part of this study proved it valid. The phenotypic characteristics of the breed are presented in table 9.

Reproductive and productive performance

Male is ready for breeding at the 4 years of age and female reaches to the time of mating at the age of 3 years. About 50 she camels are normally bred by one bull camel. While the service period remains for 6 days and estrus cycle ranging from one week to 4 week. The conceived she camel changes her behavior at 6th day of service and show a different behavior as erecting her tail when an

animal or a person come near to her. Calving interval is normally two years, depending upon the availability of foliage and lactation length. Average reproductive life of a female is about 20 years. Conception rate of camel is higher with appreciable calving percentage and rare abortion. Weight of the calf at the birth is almost 35-45 kg, depending upon the sex, nutritional and health status of the dam. Weaning weight at (9 month) is about 155-180 kg. The reproductive and productive characteristics of the Kohi camel is presented in table 10.

Marketing and future economic potential

The animals are grazing in uplands of Suleiman region since March to the end of the September and after that, the animals who ready for sale are moved to the (mela) fair of Mangrota, while rest of the animals are moved to the lowlands of Suleiman region and the adjoining areas of Sibi region, where they spend the autumn and winter season. Mangrota animal fair is the biggest of the area, and the biggest sale point for the camels.

The Kohi camel has very good economic potential in future. The camel meat has good taste because of the nature of the vegetation browsed. The Kohi meat is already famous in the pastoral families and has very good potential for export.

V Lassi

Lassi camel is found in coastal area of Balochistan and Sind. The climate of the region is hot and humid. Camel is not only use for transportation but also found as separate herds and is main livestock activity. The camel herders purely dependent on camels and earn daily needs from it.

Production systems and socioeconomic importance

They migrate with their camels to central Balochistan in winter and go back to coastal areas of the province. The pastoral people sell their animal when they need money. Camel play pivotal role in the socioeconomic life of the Lassi herders. Camel provides transportation for all means, milk and play role as a bank on hooves. The milk is usually use for family use and surplus is given in gift to friends and relatives.

Population size and trend

The population size of the breed is 7000 to 8000 heads and the trend is decreasing. The factors responsible for this sad state of situation are speedy urbanization and industrialization in the region.

Breeding goal of the breed

The main breeding goals of the breed are the production a camel with adaptation to the environment. The camel with long legs and neck is preferred because of its potential for walking in coastal ecosystem. Light fawn color is the top and preferred color but some breeders like the black shades on the belly side. Actually the breeders the main breeding preference is to select male with the ability of walking ability in coastal ecosystem and thriftiness on the vegetation of the area.

Special traits of the breed

- ❖ Adaptability to coastal ecology
- ❖ Able to drink brackish water

- ❖ Rely on highly saltiest vegetation

Phenotypic characteristics

The camel of this breed is comparatively larger in size. The predominant body color is fawn but red fawn color is also found. The camel has long legs, pointed muzzle and longer head. Phenotypic characteristics of Lassi breed is presented in table 11 and figure 6.

Reproductive and productive performance

Male is ready for breeding at the 4 years of age and female reaches to the time of mating at the age of 3 years. About 50 she camels are normally bred by one bull camel. While the service period remains for 6 days and estrus cycle ranging from one week to 4 week. The conceived she camel changes her behavior at 6th day of service and show a different behavior as erecting her tail when an animal or a person come near to her. Calving interval is normally two years, depending upon the availability of foliage and lactation length. Average reproductive life of a female is about 20 years. Conception rate of camel is higher with appreciable calving percentage and rare abortion. Weight of the calf at the birth is almost 35-45 kg, depending upon the sex, nutritional and health status of the dam. Weaning weight at (9 month) is about 155-180 kg, presented in table 12.

Marketing and future economic potential

One of the main markets for Lassi camel is Karachi and other larger cities of Sindh, especially at the occasion of Eid Aladha. The sacrifice of camel in Karachi is getting popularity at the occasion of Eid Aladha. The other main market is the export of camel to Iran. Now the camel milk is also getting popularity among the urban dwellers for the treatment of ailments like backache, long bone pains and hepatitis.

VI Raigi

Raigi camel is predominantly found in the historic Khurasan region. The region had very rich history. Avesta, the holy book of Zoroaster, written in 2570 and 25230 BP, called Khurasan as Arya Warsha (mean the place for grazing). The word is still in use as Pashto (Warsh) word for the grazing land (Habibi, 1999).

Production systems and socioeconomic importance

The Raigi camel is well adapted to the climatic extremes and is well appreciated for its' significance in the pastoral economy. It is mainly raised under nomadic and transhumant types of production systems. Only male animals are kept for work by some sedentary people, but some sedentary people keep she-camel for milk. The transhumant or semi-nomadic people travel inside the Khurasan region either in Pakistan or Afghanistan, but some families travel up to Musakhail district of Balochistan province in winter.

The nomadic people travel south western along with the border on both sides and reach to the Raig (Raigistan) desert of triangle i.e. Afghanistan, Pakistan and Iran. They stay in winter there and come back to Khurasan in summer. Those people mainly raise Khurasani goat and Jiggie sheep. In Khurasan, camel is being used mainly as baggage animal by the pastoral people, who travel with their families along with the Durand Line and may stay near Kandhar, Hirat, Farah, and Kurrum

area of Chaghai district in Balochistan. The sedentary people mainly use Raigi camel for milk and local transportation.

In Khurasan region camel is used on religious rituals like Eid ul Azha and Sadaqa. The meat of camel is traditionally dried (Landi) and use during the winter. In recent years the importance of camel increased many folds due to various factors like drought, high male calf prices, demand in the neighboring countries, and awareness about the camel products.

Population size and trend

Their populations of the Raigi herders are estimated to number about 300-500 households, but the exact figures are hard to find because of the remoteness and instability of the area. The breed is cross boundary in nature and need to be study from the both sides. Normally the average herd size is small (13) but the range is too wide and ranges from 4-150 animals. The estimated population of the breed ranges from 4700 to 7000. The trend of the population is not appreciable and decreasing in number because of high slaughter rate and political instability in the region. The other main reason is the increasing desertification and scarcity of the feeding materials in the area.

Breeding goals

Thick and consistent milk production for longer duration is one of the major breeding goals. Wide chest and wide cannon bone, a criterion for good climbing ability in mountainous ecology is another breeding goal. Also, long travelling ability is the important breeding goal to enable it for nomadism.

Special traits of the breed

- ❖ Thick milk is special trait, one of the most thick milk in camel breeds
- ❖ Drinking brackish water
- ❖ Eating the bitter taste plant *Artemisia*

Phenotypic characteristics

The color of the Raigi camel is fawn in summer and brown in the winter season. The camel has long eye lashes. The Dark brown retina and the black nails are in the Raigi camel (figure 7). The large barrel like body cavity of the Raigi camel indicates its dairy potential in the future. The phenotypic characteristics of the Raigi camel is presented in table 13.

Reproductive and productive performance

The breeding age for male and female is 3.5 years and 3 years respectively. One vigorous bull is satisfactory for breeding of 40 animals. Service period remains for 5 to 6 days and estrus cycle ranging from 1- 4 weeks. If conceived, she camel changes her behavior at 6th day of service and show a different behavior as erecting her tail when an animal or a person come near to her. Calving interval is normally 2-3 years, depending upon the availability of foliage and lactation length. Average reproductive life of a female is about 15 years. Weight of the calf at the birth is almost 30-33 kg, depending upon the sex, nutritional and health status of the dam. Weaning weight at (9 month) is about 140-160 kg, presented in table 14.

Marketing and future economic potential

The markets of the cities like Ghazni, Zabul, Kandahar and other cities of Afghanistan are the main markets for the meat of this breed. Some animals reach to the meat market of Zhob in Pakistan. The new trend of market is also increasing i.e. illegal export of camel to Iran for meat. There is high consumer demand for camel meat locally. The local people use camel meat for Landi in winter, and also slaughter animal on special occasions like Eid and sadaqa.

The milk of the camel is saltiest in general but this phenomenon is specific for Raigi, which entirely graze on haloxylon and artimisia. The surplus milk is used especially used for Shlombey and Kurth. The Raigi camel is famous in the region for its thick milk yields and can give top yields of 5-6 kg per day in ordinary grazing system. Camels are milked twice or thrice per day, usually at nighttime and in the early morning hours. Lactation lengths average one year and calving intervals approximate two years.

4.2.2 Sheep

I Kajalle

Habitat: The nucleus of the breed is Wani , Gosa, Babar, Kapip areas of Zhob and Hassankhail area of Musakhail district. Kakar, Khostai, Babar, Sherani, Hassankhail tribes are the custodians of the breed (Figure 8).

Phenotypic characteristics: Small in size, white body coat with red head, fine dense wool are the salient feature of Kajalle breed.

Vegetation: The vegetation of the area likes by the Kajalle sheep consists of Saba, Barawaza, viza, Saragarri and Ghozara, Spanda.

Population: The population of the Kajalle sheep is almost 200,000 and the trend is increasing.

Special traits

- ❖ Resistant to dry years (*Tha kal sakhtha*)
- ❖ Can survive with very scarce vegetation (*pa laz abadi guzara kavi*)
- ❖ mouth and muzzle is like forceps and can graze on tiny vegetation
- ❖ The meat is delicious and not decreases in size after drying (*Landi meat*), when the dry meat is put in water, it regains its size
- ❖ Wool is like cotton and second coat of wool also appear in winter. The wool is dense (*Thathwargi*)
- ❖ The milk is yellowish like cow milk and have more butter fats (high fats contents)
- ❖ The breed is persistent in characteristics and don't change easily. When other breed's ram is offered the breed not change easily (*the nasal sakhta*)
- ❖ Good learning and obedient animal with the shepherd and owner

Option hopes: Drought resistant, water resistant, Can survive with very scarce vegetation (*pa laz abadi guzara kavi*)

Economic importance: The breed is a good tool and security of income in hard days (dry years and days). Hard years mean dry years and hard days mean when there is no mean of income then the breeders sell extra animals. Usually they never intend to sell their sheep, especially females.

The breed is usually use as subsistence type of production system; the milk is use as fresh, for tea and by-products like ghee, butter fats and Kurth. The meat is mainly use for Landi purpose. As the meat are highly delicious, tender, high local consumer preference, good marbling and taste. The wool is dense and is usually prefer than many breed, because of its lengths, softness and spinning qualities.

2 Thor Ghuzi or Waziri

Habitat: The original area of the breed is Zhob (Thora khula, Shighala, Chukhen, Kunder.Mandokhail, Sherani, Harifal, Babar, Kakar), Musakhail district (Kudazi, and Essot areas). The breed is mainly found in Waziristan of FATA (federally administrated areas). The tribes of the breed are mainly Ghourghasti clans of Pashtoon i.e. Kakar, MandoKhail, Kudazai Musakhail and Essot.

Phenotypic characteristics: The sheep is white in color with black ear or complete face. The wool is fine and dense. The body size is larger than that of Kajalle (figure 9).

Vegetation: The vegetation of the area like by the breed is consisting of Saba, Sargarre, Warrwashai, Spinazghai, Viza, Ghalmai, Zumai, Paha, Tharkha. Zumai and Ghalmai.

Population: The population size is almost 350,000 and the trend is increasing.

Special traits:

- ❖ Mountainous in nature like goat
- ❖ Well in training and obey the orders of shepherd
- ❖ Snow white wool
- ❖ More weight and height compare to Kajalle
- ❖ The ghee is fattier (more density) (**Stokh**) than any other breed of the region.
- ❖ Prolificacy rate is more, i.e. more number of offspring in life time of the ewe
- ❖ Good learning and obedient animal with the shepherd and owner

Option hope: can use the vegetation of high altitude and consume woody vegetation.

Economic importance: Source of income and livelihood. Wool is more economically important, but now a day the prices have gone very low. Good for hard days. The pastoral people never intend to sell their animals regularly, especially female but only sell in hard days.

3 Kakari

Habitat: Kakari sheep is found in all Kakar belt. The main areas of the breed are Zhob, Loralai, Qillasaifulla, part of Pishin and Musakhail districts. The main tribe as indicated by the name is

Kakar, also known as Thorghuazi. There are two main types of Kakari sheep, i.e. Thorghuazi and Bori. Bori is mainly found in Kakar Khurasan and Toba Kakari range, while Thorghuazi found in Zhob, Loralai and part of Musakhail districts.

Phenotypic characteristics: White body color, soft wool, Kooki & Zabarrghuzi (very small & droopy ear), all or partial of the face is black and head is usually black (figure 10).

Thorghuazi type is close to Bybrik, and can only differentiated on the basis of tribes, topography and production systems and wool (Kakari has soft long wool). The Bybrik has harder wool than Kakari.

Vegetation: The vegetation highly liked by the breed is much diversified, because of the diversity and vast area of the breed. Vegetation of the region is also different in different seasons i.e. spring and monsoon. The vegetation very much like is composed of Surgulgi, Ozie, Saba, Barwaza, Murgha, Sargharri, Barawga, Chobri, Saba, Murgha, Viza, Spanda, Tharkha, Sargarre, Ghozera and Barvaze etc.

Population: Population of the breed is about 3.2 million, one of the major breeds of the Pashtoon belt of Balochistan province. The trend is increasing again after the drought spell.

Special Traits:

- ❖ The wide diversity within the breed is very important. Kakari are many types, i.e. mountainous & plain land, and smaller size (Abdullazai area) & larger size (Kibzai area)
- ❖ Hardy to dry years
- ❖ Long soft wool
- ❖ Good in gaining weight and good for stall feeding

Option hope: Feed lot systems for fattening of lambs is the future hope for this breed

Economic importance: The breed is source of income in hard days and the breeders usually not intend to sell their sheep, especially females. The breed is usually use as subsistence type of production system; the milk is use as fresh, for tea and by-products like ghee, butter fats and Kurth like Kajalle. The meat is mainly use for Landi purpose, as the meat high local consumer preference, good marbling and taste. The wool is dense and is usually prefer for making local rugs.

4 Musakhaili

Habitat: Found in Musakhail district of northeastern Balochistan and the main tribe of the breed is Musakhail as indicated by the name. Moreover, the breed is also raised by Marghzani, Zamri and Issot and Jaffar tribes of Musakhail district.

Phenotypic characteristics: The breed is higher in size compare to Bybrik, accumulate more fats in tail, wide tail and hanging tail, head is larger and wider. The wool is same like that of Bybrik. The sheep of Musakhail breed is more attractive for trader. The distinctive characteristics of the breed

are long hair in the base of the horn. Spotted ears, black spots on wool and skin on the rump area are the prominent feature of the breed (Figure 11).

Vegetation: Vegetation highly like by Musakhaili sheep is comprised of Khuriasa, Ozi, Viza, Paha, Saba, Zangi, Barawa and Barvaza etc. The vegetation is different in different season and topography.

Population: The population size of the breed is almost 2.9 million and the trend is increasing.

Special Traits:

- ❖ Can climb on high mountains and consume the inaccessible vegetation
- ❖ Get more weight in short duration and fill the tail with fats very fastly, hence can resist the dry period
- ❖ Good response to stall feeding and grains offer
- ❖ The wool is thin in density (*Khalaswargi*) and is good to resist high temperature
- ❖ Consume bushy vegetation when there is scarcity of grasses

Economic Importance: The breed is not only raise for family subsistence. The breed has very high economic returns by selling male animals at the age of 8 months. The animal has high trader preference and mostly reaches to the market of Iran and even Middle East. The crop reaches early in the market because of the early breeding season. The milk of the breed is not use for family needs but allow to the lambs. The wool has no higher economic importance and is mainly send to the market of Punjab province and is usually use in the carpet industry.

5 Bybrik or Marriwal

Habitat: Mostly found in Marri and Bugti hills of the province. Also found in the Barkhan and part of Sibi, Loralai and Musakhail districts. The nucleus areas are Duki, Kohlu, Chamalang, Hosrri, Girsani, Lakhi Putth, Khar Chah, Rarra sham and Deddar.

Phenotypic characteristics: The breed is medium in size and need lesser amount of feed. The sheep color is usually white with black muzzle and ears. Some specimens with spotted body, black head are also found, mainly in Barkhan and Musakhail areas. The tribes of the breed are mainly Marri, Bugti, Masurri, Kethran, Buzdar, Syed and Musakhail (figure 12).

Vegetation: The vegetation liked by the breed is Sargari, Barwazi, Gandali, Murgha, Pah, Spanda and Ghalmai.

Population: Population of the breed is almost 2.7 million and the trend is increasing.

Special Traits:

- ❖ Hardy to drought
- ❖ The tail is smaller, compact and less fatty, making it easy to climb on mountain
- ❖ Hardy to water scarcity and weather intensities
- ❖ High meat preference for barbeque
- ❖ Very high demand in Iran and Gulf because of taste and marbling

Economic Importance: The breed is mainly raised for lamb production. The breed has very high economic returns by selling male animals at the age of 6-8 months. The animal has high trader preference and mostly reaches to the market of Iran and Middle East. The crop reaches early in the market because of the early breeding season like Musakhaili sheep. The milk of the breed is not used for family needs and allowed to the lambs. The wool has no higher economic importance and is mainly sent to the market of Punjab province and is usually used in the carpet industry.

6 Dumeri

Habitat: Dumeri or Hernai breed is found in Ziarat, Hernai and part of Quetta, Pishin, Qillasaifulla and Loralai districts. The nucleus of the breed is Sanjavi, Zalar, Hernai, Shana Gharra, Spin Tangi and Zarghoon. The tribe of the breed is Kakar, Wanechi and Salgari, especially sub clans of Kakar, i.e. Dumer and Zakhpail.

Phenotypic characteristics: The sheep is medium in size with soft fine snow white wool. The head of the sheep is red with horns in male animal. The ears are sometimes droopy and sometime very small (figure 13).

Vegetation: Vegetation of the habitat much like by Dumeri sheep is comprised of Saba, Sargharri, Mulghuzgi, Makhi, Rrandoki.

Population: The population of the breed is bit hard to compile because of the scattered nature of the breed in a wide area. Moreover the estimation on the basis of the breeders and flock size the estimated population of the breed 1.3 Million. This breed shrivels in size because of two reasons, First reason of the shrinking was the drought, and this breed was severely affected. The second reason is the high return of orchard farming of apple and Cherry in the region. Because of the drought and other social changes many breeders shifted towards orchard farming. Though the number of the breeders decreased but the breed is again increasing in size.

Special traits:

- ❖ *Assili* mean good thriftiness nature, high compensatory growth
- ❖ This breed of sheep is hardy and can survive in dry period
- ❖ The goat like nature enable it to graze in the peaks of the mountains
- ❖ The meat is tender and juicy, very much liked by local consumer
- ❖ There is more meat compared to bones compared to other breeds

Option hopes: Because of its goat like nature, it can be used as a tool in climate change situation.

Economic importance: The socioeconomic condition of the breeding area of Dumeri sheep is good and the people like very much Landi meat because of the high altitude and very cold winters. The male animal at the age of 2-3 years is used for Landi purpose and catches very good prices. The female produces reasonable amount of milk and used locally for family use. The wool once had very high prices. The wool of Dumeri sheep is one of the finest in the country and had been used for

spinning in Hernai woolen mill, administrated by government is now un operational. The breed is important source of livelihood earning. Female rate is almost Rs. 8000 and male is Rs. 12000.

7 Mangeli

Habitat: The major habitat of the breed is the central Brahvi land. The nucleus areas are Kalat, Mastun, Khuzdar, Wadh and Awaran. The tribe of the breed is Maingul.

Phenotypic characteristics: The sheep is medium in size with coarse wool, black and white body coat. The head of the sheep is usually black. The ears are long and droopy (figure 14).

Vegetation: Vegetation of the habitat much like by Mangeli sheep is comprised of Saba, Sargharri, Hawe, Gorkha and Kashum.

Population: The population of the breed is bit hard to compile because of the scattered nature of the breed in a wide area. Moreover the estimation on the basis of the breeders and flock size the estimated population of the breed 1 Million. This breed shrink in size because of two reasons, First reason of the shrinking was the drought; this breed was severely affected like Dumeri sheep. The second reason is the high return of orchard farming of apple and Cherry in the region. Because of the drought and other social changes many breeders shifted towards orchard farming. Though the number of the breeders decreased but the breed is again increasing in size.

Special traits:

- ❖ Good thriftiness nature, high compensatory growth
- ❖ Good ability to graze in small area
- ❖ Good scavenger animal, also fit for grazing on the waste of the city
- ❖ High milk producer under the low input production system.
- ❖ High meat yield and reasonable growth rate

Option hopes: Grazing of the highlands of the region.

Economic importance: The breed is highly thrifty and produces more meat per unit feed gain compare to other breeds of the region. The male animal at the age of 2-3 years is use for Landi purpose and catches very good prices. Mangeli is one of the best milk producers in the province. The lambs of the breed can be used for feed lot system to produce more and healthy meat. The male at the age of 3 years attain a weight of 80 kg. The lambs are usually slaughter at the age of 3 years for Landi purpose. The breed is important source of livelihood earning and the prices are very high for Mangeli sheep in the province. The rate of a Mangeli ewe is almost Rs. 12,000 and that of male with 3 years of age ranges to a price of Rs. 20,000.

4.2.3 Goat

I Berberi

Habitat: Kachhi basin is the home tract of the breed. The area has very high ambient temperature which may reach up to 52 °C. The tribes of the region, in the north there are Pani and Kakar Pashtoon tribes and in the south is Rind, Lehri, Somro, Bugti, Mari, Khoso, Jamali, Jatoli and Resai.

Phenotypic characteristics: The goat is smaller in size with multi coat colors. The breed is multicolored, i.e. white with black patches, white, red, yellow and others, but the preferred color is white, because of the resistance to high temperature. The goat has high prolificacy rate and produce reasonable amount of milk to feed her offspring (figure 15).

Vegetation: Vegetation of the area like by the goat is *Acacia*, *Dalbergia*, *Zizyphus*, *Presepis Juliflora*, *Panicum antidetals*, *Halexylon* spp and *Alhagae camalorum*.

Population: Population of the breed is almost 0.8 million. The breed is also found in the in the adjoining areas of Sindh province, reared by Baloch tribes. The population trend is increasing.

Traits special:

- ❖ The goat of this breed is highly resistant to high temperature
- ❖ High prolificacy rate and good mothering ability
- ❖ The animal is very alert and fast running like a deer, hence can't be preyed by pest and predators. More close to wild ancestors
- ❖ One of the fast growing goats in the province

Option Hopes: Tolerance to high ambient temperature.

Economic importance: Because of the fast growing ability and high prolificacy, the breed can be use for mutton production in the hostile climatic conditions of the region. The male bucks of age more than one year already gained very high prices in the major livestock market of Sindh province especially, at the occasion of Eid Aladha. The beauty of this breed, looking like a deer also attract consumer at the occasion of Eid Aldha.

II Kohi-Suleimani

Habitat: Musakhail, and other mountainous area of Suleiman mountains region. There are many tribes, rearing this breed of goat. The tribes are Bugti, Marri, Syed, Kethran, Hasni, Kakar, Mandokhail, Pani, Buzdar, Qaisrani, and other Pashtoon and Baloch tribes.

Phenotypic characteristics: The goat has large size with black or white head, red neck and red head is also preferred. The animal may attain good weight and attract good prices because of its meat and height (figure 16).

Vegetation: Vegetation of the area like by the goat is *Acacia modesta*, *Caragana ambigua*, *Bararr*, *Gurgulla*, *Sarwane*, *Showan*, *Ghalmi*, *Lani*, *Jand*, *Zizyphus*, *Halooxylon grifithi*, *Halloxlon recurvum* etc.

Population: Population of the breed is almost 1.5 million. The breed is also found in the tribal territory of Punjab province, reared by Baloch tribes. The population trend is increasing.

Traits special:

- The goat of this breed is highly resistant to drought
- It is very accessible to inaccessible areas for grazing
- The animal is very alert and fast running, hence can't be eaten by pest and predators. More close to wild ancestors
- High milk production than local sheep and provide milk in summer for family needs

Option Hopes: Kohe-Suleimani goat is more effective tool against drought because it reaches to difficult area for grazing.

Economic importance: The animal may attain good weight and attract good prices because of its more meat and height. The male kids are mainly raised for market sale. The breed has very high economic returns by selling male animals at the age of 2year, mainly slaughter at EidulAdha occasion. The female produce reasonable amount of milk and use by the pastoral community locally and extra milk is converted in ghee.

III Khurasani

Habitat: The historic great Khurasan, Toba Kakari, Suleiman mountains region of Zhob and Sherani districts, Qillasaifullah, Loralai, Ziarat, Chaghai and Pishin districts are the main niche of the breed. The breed is equally raised by nomadic, semi-nomadic, agro pastoral tribes of Pashtoon people. The Baloch tribes of Chaghai-Kharan desert also raise this breed. The nomads with Khurasani breed move from Khurasan in autumn and may reach to Indus delta and some tribes reach to Chaghai-Kharan desert. The breed is trans-boundary.

Phenotypic characteristics: The phenotypic characteristics of Khurasani breed are black long hair coat, turned back horns and fine second hair coat in winter. The breed is predominantly black in colour with red face but some other colour is also found occasionally (figure 17). The males have beard also.

Vegetation: *Acacia modesta*, *Caragana ambigua*, Bararr, Gurgulla, Sarwane, Showan, Wanna, Barrai, Ghalmi, Shorai, Lani, Azghai, Sassi, Ghaz, Korai, Sperbutai, Oma, Murgha, Tarkha and Zizyphus.

Population: The population of the goat is hard to predict, because of the wide scattered nature. It is estimated about 2.7 million. The trend is increasing.

Special traits

- ❖ The animal of this breed is highly intelligent, making it safe
- ❖ The Khurasani goat is loving to her soul and take care of herself, can find vegetation and water
- ❖ Always lead other livestock towards water and vegetation
- ❖ Close to wild ancestors and highly resistant to diseases
- ❖ Can travel long

Hope options: Goat is more effective tool against drought.

Economic importance: The male animals are the major source of earning. The animal is smaller in size and cannot attain as higher prices as Kohe-Suleimani goat. Moreover it is good in milk production, and milk is use for by-products like ghee and Kurth. The goat also produce pashmina, but the importance of pashmina is not yet being realized. The hair is use for making ropes and tents.

IV Morak

Habitat: Chaghai Kharan desert especially Raskoh mountains of the region are the home tract of the breed. The breed is very close to its wild ancestors. There are many tribes, rearing this breed of goat, which are Badeni, Muhammad Hasani, Maingul, Jamaldini, Sasoli, Sanjrai, Nothezi, Nausherwani, Malangzai, Siafad, Faqirzai, Hajizai,.

Phenotypic characteristics: The goat has medium size with black body coat, very rare specimen with white color is also found. The long curled horns, especially in male with beard are the salient feature of the breed. The goat also produce reasonable amount of milk (figure 18).

Vegetation: Vegetation of the area like by the goat is tree like Ghaz (*Tamarix Articula*), shrub like Taghaz (*Haloxylon Amodendron*), bushes like Hashwarg (*Rhozya Stricta*), Pog (*Calegnum Polygonoides*) Cotor (*Stockcia Brohinca*), Lara (*Salsola Kali*), Kandar (*Alhogi Camelarum*), Barshonk, Karwankush, Narronk (*Salsola Arbuscula*), Tusso (*Gaillaina Aucheri*) and grasses like Mughair (*Atriplex Dimprphostegium*), Kash (*Sacchorum Siliare*), Righith (*Suoeda Monica*) Shanaluk (*Allium Rubellum*). etc.

Population: Population of the breed is almost 0.5 million. The population trend is increasing. Morak breed is one of the badly affected goat breed in the province by last drought, as the drought was very severe in this ecological zone.

Traits special:

- Close to its wild ancestors
- It is very accessible to inaccessible areas for grazing, i.e. the peaks of the mountains
- The animal is very alert and fast running, hence can't be eaten by pest and predators. More close to wild ancestors
- High milk production in harsh environment of the region in a very low input system of the ordinary grazing

Option Hopes: Close relation to its wild ancestors.

Economic importance: The most important breed for livelihood earning of the pastoral livestock keepers of the region. It provide milk in the harsh environment when the sheep milk yield ceased. It also provides cash by selling it, when the livestock keepers need cash money. The animal may attain good weight and attract good prices because of its more meat and height..

4.2.4 Cattle

Kohe-Suleimani officially Lohani

Habitat: Musakhail, and other mountainous area of Suleiman mountains, Zhob, Sherani, Kakar Khurasan, Loralai, Kohlu, Barkhan, Qillasaifullah, Dera Bugti and Sibi districts. The tribes rearing this breed of cattle are many, i.e. Pani, Kakar, Mandokhail, Hasni, Syed, Buzdar, Kethran, Sherani and other Pashtoon and Baloch tribes. The nucleuses of the breed are Zamri area of Musakhail and Rarkan area of Barkhan districts.

Phenotypic characteristics: The breed has wide diversity and there are many colors, i.e. white with red spots, white with black spots, red, brown, black, tan and grey colors. The size variability is also there, i.e. the animals live in the high altitude have compact body with smaller body size and the animals live in the river and plain area get larger body size (figure 19).

The cattle of this breed reaches to puberty at the age of 2 years in good feeding conditions. The milk production is 18 to 30 piala (Piala is a local measurement, measure with local tea cup and 8 piala is one kg) daily, in ordinary grazing system. Body condition score is always good than the pure and cross Friesian. The milk is also thick, very high consumer preference and produces more ghee. The ghee of the breed is highly preferred and many Pashto poems are singing to praise it.

Vegetation: The vegetation like by Kohe-Suleimani cattle is mainly composed of bush, mainly found in the streams and river banks. The main vegetations are comprised of Sargasse, Saba, Mashkana, Surmagh or Spermagh, Lukha, Viza, Barvasa and Saba etc.

Population: The breed is found in a large territory of Balochistan and also in the adjoining parts of Punjab and Pakhtoonkhua provinces. The population estimation is for the areas falling in the Balochistan province is about 1.8 million and the trend is increasing.

Special traits:

- ❖ They climb in mountains and use the vegetation of the high altitudes
- ❖ Consume highly fibrous material
- ❖ The disease register is very low, highly resistant to trypanosomiasis and other ticks diseases.
- ❖ **The kal sakhta** (resistant to dry years)
- ❖ Milk production is persistent and not adversely affected by weather and feed scarcity
- ❖ Very hardy animal and use for draught power in mountains
- ❖ **The yakh sakhta** (resistant to cold weather)

Option hopes: More effective tool against drought, because of its climbing ability and consuming highly fibrous feed

Economic importance: The male animals once mainly use for draught power is now getting very higher prices in market for its meat quality. Mostly male animals are sold at the age of 3 years at the occasion of EidulAdha and catch very high prices. The milk is mainly use for family use and extra milk is converted in ghee. The ghee is usually consume at family level but extra is sell out by the women of the family and the earning goes to women. This breed is very important for woman.

4.2.5 Donkey

I Shinghari

Habitat: The production area of this breed is Khurasan, Suleiman mountainous region, Marri and Bugti hills. The nucleuses of the breed are Kakkal of Kibzai tribe, Meerkhani of Buzdar tribe, salatha and Hazargat of Maghdozai tribe, Zamari, Shighala of Mardanzai tribe, Sharan of Babakarkhail tribe, Kohai of Issot, Goshani area Baloch tribe and Masuri tribe of Bugti area. The nomads are the main traders and users of the breed.

Phenotypic characteristics: There are many colors in Shinghari breed of donkey, but the dominant and selective color is white. The breed is of larger size and well adapted for the ecology of the area. Famous drought animal use equally by the city draught carters, nomads and pastoral people locally. Now a day's very famous and widely use by chromites mines diggers. Carry a weight of load on back up to 240 kg in plain areas and 160 kg in mountainous areas. Age at first mating is 2-4 years depending upon the feed availability and type of work (figure 20).

Vegetation: Consume all types of grasses and bushes. Even consume woody vegetation of trees. Eat bark and wood in the time of feed scarcity.

Population: Population is about 1.2 million and the trend is increasing in breeding herds and decreasing sporadic use by ordinary people and carters in cities. The use is decreased in cities because of China's made Rickshaw for work. This decreased use is replaced by mining industry.

Special traits:

- ❖ Very hardy and consume very fibrous feeding materials
- ❖ No leech infestation because drink water with closed jaws
- ❖ Highly resistant to diseases
- ❖ Very fit to work in mountainous ecology
- ❖ Can walk long, making it fit for nomadic system

Economic importance: The Shinghari donkey is very famous drought animal use equally by the city donkey carters, nomads and pastoral people locally. The demand is increasing in the mining industry, especially chromites mining. The main marketing place is Mangrota camel fair. The price of a vigorous healthy male may reach to 50,000 Rupees per head.

II Sperki or Piddie

Habitat: The production area of this breed is the same like that of Shinghari, i.e. Khurasan, Suleiman mountainous region, Marri and Bugti hills. Mostly found in Kohlu district.

Phenotypic characteristics: Smaller in size, very wild and cant easy to handle. A threat to Shinghari breeds because of high libido power and conceive Shinghari females. Carry a weight of load on back up to 160 kg in plain areas and 60-80 kg in mountainous areas, mainly use for water transportation and light agricultural operations. Age at first mating is 2 years depending upon the feed availability and type of work (figure 21).

Vegetation: Consume all types of grasses and bushes. Even consume woody vegetation of trees. Eat bark and wood in the time of feed scarcity.

Population: Population is about 0.5 million and the trend is stable or even decline.

Special traits:

- ❖ Very hardy and consume very fibrous feeding materials
- ❖ No need of any care and management
- ❖ Highly resistant to diseases
- ❖ Ability to run fast

Economic importance: This breed of donkey is mainly use for water transportation and light agricultural operations. The kids of nomads are also carrying by this donkey. Also use for light carts in cities of Punjab and Sind. Also use as game animal in Punjab and Sind province for cart racing, hence catch high prices by hobbyists.

4.2.6 Feedback seminar of the livestock keepers

A feedback seminar (3 days) was held in Quetta, the capital of the province in the month of January, 2010. The breeders, well familiar with the characteristics of the breed were invited and each breed was discussed with them. After the discussion about the breeds, customary laws, lesson learnt from the previous drought and problems of the livestock keepers were discussed. The group photo of the participants of the feedback seminar is presented in figure 22.

I Customary Laws

The land inhabited by Pashtoon pastoral people in northeastern Balochistan is owned by communities. Only the roadsides, railway lines and the state areas near the towns and cities belong to the state. There is no conserved area by the Government in the Pashtoon lands of Balochistan. Every community and has his own area, which is comprised both of mountainous and plain lands.

After the crop harvest, during the monsoon rains, the pastoral people move towards high mountains and graze the remote and high peaks of the mountains. This type of movement saves their livestock from foot and mouth disease also. The piedmonts and the plain lands are conserved and nobody is allowed to graze animal there, the conservation is called as **Pargorr**. The temporary and short settlement in the mountains is called as **Gholai**. They come down to the plain lands crossing the piedmonts and settle for the period of autumn here. The conservation of plain lands for autumn is called as smaller Pargorr. In winter they travel again to the piedmonts area of the mountains and stay there for longer period. This settlement is known as permanent settlement and called as **Pakha Mena**. They spent winter here. The topography of piedmonts saves them from the affect of fast wind in the region.

The pastoral people of all the community's tribes respect the customary laws. The people of other community can come to graze in the area of some other community, but the willingness of the owner community is necessary. Sometimes outsider tribes come without permission along with their animals and create problems. The elders of the tribes call **Jirga** and settle the issue. These types of situation usually create when there is dryness in the area of other tribe and nothing available for grazing. Usually pastoral people help each other and if permission is opt then there is no trouble. But there is one important customary law that there is no restriction for camel. Camel can be grazed anywhere and anytime of the year.

The afghan nomads have no rights of settlement. They can cross the areas and can stay for 3 days in one community area. The nomads also called as **Pawinda** have their station (Gholai) where they can stay for three days. Each tribe of Pawinda has their own fix route. Sometimes they can stay more than 3 days at one station, if there is rain or snow and their tent is wet. According to customary laws they are bound to abide by the laws, otherwise the local administration is being involved and they are pushed to move forward. Some communities allow Pawinda for whole period of winter in specific reserved areas and charge them according to the number and specie of the animal and the charge is called as **Tharni**.

Every tribe of Pawinda has his own tribe and it is well established.

Dotani route is Thoi of Waziristan, but this route is in trouble and the tribe is now passing through Zhob valley. This state of situation has created problems among the pastoral communities and Pawinda. According to local customary law they have no right to pass through this area. Also Dotani tribe has very large size of animal flocks and herds.

Suleimankhail tribe crosses the famous Gomal pass and inter in Indus delta near Bhakkar of Punjab province.

Safi and Akakhail and part of Jiggie tribe have the route in the Kakar land of Zhob and Qillasaifulla.

Shinwari, Andar and Kharoti have the route to pass in the Kakar land of Loralai and Qillasaifulla and reach to Anambar area of Duki Loralai in winter and stay there for whole winter and pay Tharni to Loni tribe. Some clan of Shinwari and Kharoti tribes reach to Kethran area and pay Tharni for winter settlement.

Taraki and part of Suleimankhail tribe cross Bolan and reach to the Pat or Kachi basin of Southern Balochistan and some cross the area and reach to Sind province.

The customary laws are oral laws and respected by the Government. These laws were formulated in Shahi Jirga of Balochistan and were respected by the British government.

II Lessons we learnt from droughts

We are the custodian of the livestock breeds, so we tried our best as our ancestors did to save it at any cost.

The first possible solution for the problem to save livestock in hard years we found is culling of the larger herd/flocks. To sell out the sick, old, weak and unproductive animals in the start of the dry period is an important tool to fight against the drought. Spend the money gained through the sale of the culled animals on the feeding and health of the animals.

We learnt that we must divide the livestock specie wise, i.e. sending the goat flocks to the high mountains along with the donkeys and young vigorous family members. There was still vegetation in the mountains but there was scarcity of water. The young men can convey water on the donkey back to the goat in remote as the indigenous goat consumes lesser amount of water. Movement of the camel to the remote is also the solution for saving camel. The camel can consume woody vegetation in the remote highlands and can resist water scarcity.

We learnt that camel is the main solution for the drought period. Camel can reach to the remote water point after a long period of grazing. The remote vegetation can be judiciously consume by camel in winter as camel need water once in a week in winter. The camel is also fit for traveling and transportation of family luggage in the inaccessible areas of the mountainous ecology of our region.

Animal health cure is also very important in the dry years, as the weak and emaciated animals are more prone to disease.

III Problems of the Livestock Keepers

A Decreasing potential of rangelands: Rangelands production potential had been decreased manifold because of the long drought period and over grazing. Deforestation made the situation adverse more than ever. The vegetation of the rangelands had been removing for fuel wood very continuously. Both the types and intensity of vegetation had been decreased resulted in dryness and desertification. Due to stress on grazing lands, concurrent droughts and deforestation the land has already been prone to erosion resulted in low water absorption. The animal with low quality feed intake resulted in lower health, poor quality product and prone to diseases. All the above factors increased the intensity of poverty and many more families crossed the line of poverty.

Our customary laws are one of the important tools, which can be use for the protection of the rangeland's vegetation. *Pargorr* is our traditional way of conservation and an important article of our customary law. Due to the weak rit of government and destabilization of the social tribal system, some problem arising with application of the customary law. The government had been serving since British era to implement customary laws strictly. Also due to the instability in

Afghanistan and other border areas, the irregular movement of the Afghan nomad has worsened the situation.

B Water scarcity: Water scarcity is one of the major issues in the province. Water sources are very scarce especially in the uplands of the mountains and deep desert. Though, sometimes feed is available but when the animal reaches there they can't reach back to the water source.

C Lack of animal health facilities: New disease appeared in the register of livestock diseases of the area due drought, low vigor, zoonotics, i.e. PPR, new form of FMD, CCHF, udder decay disease and the most new is the diarrhea with water comes from the mouth. These diseases have been resulting in the loss of millions of livestock. The intensity of the diseases like anthrax, HS, Enterotoxaemia, FMD, pox, CCPP has increased many folds. The vaccine in most of the cases is not available and there are no diagnostic labs, if available either not equipped or no staff is available. Livestock vanishes with the consequences of diseases and nobody responsible for that.

D Lack of modern knowledge and skills: Social, environmental, anthropological changes are affecting our way of production. Modern technologies and media affect our life resulting in social change resulting in flying families from livestock keeper's community and migrating to urban areas. This dilemma is resulting in creating pressure on the urban resources. Decreased number of livestock keepers, social change.

Also the human population is increasing speedily because of social changes and put more pressure on natural resources. Our forefathers had been keeping family size according to the livestock number the family owned, but the situation is changed now. The changes in environment has been badly affected our lifestyle and production system. The concurrent droughts, fast winds, creeping desertification had made the situation complex. There are modern techniques to cope with such circumstances in the other parts of the world but the livestock keepers of the province are deprived of it.

Lack of education in our production system is one of the major social problems. The government has no solution to provide education to our kids in the prevailing conditions of our livestock production system. We left behind of all basic needs like education and health. There is no quota for the livestock keepers in the animal health and husbandry education.

E Drip loss of precious animal genetic resources: Foreigners especially Arabs come and buy the cream of the genetic resources with the help of the local administration and illegal traders. Also the government organization import exotic breeds and crosses our precious well adapted livestock breeds. In the last drought period we learnt that the indigenous breeds were many folds drought resistant to exotic breeds. This dilemma is very complex in cattle.

F Marketing of our product: No rules and regulation of marketing, the livestock business benefits go in the pockets of the opportunists' traders. Our products are organic in nature and have very high value in international markets, but there is nobody in the country to argue for our products.

G Policies without the livestock keepers: No share in policies related to livestock and genetic resources. The Government and other agencies' policies apply from top to bottom approach and the keepers are not asking to share their views and concerns. The policies remain unsustainable and completely fail in short period. The distribution and restocking of livestock project is the eminent example in this regard.

5. Conclusions

Balochistan is the largest province of the country by area and majority of its populace live in the rural and remote areas. The major source of income among the rural and remote dwellers is livestock rearing. About 90% of the provincial land is comprised of rangeland. These rangelands provide feed and shelter to a wide diversified livestock breeds of the province. These rangelands are owned by communities of tribal people, and the only use is livestock production. The precious livestock breeds are well adapted to the diversified ecological zones of the province. The livestock breeds are multipurpose and fulfil a wide range of needs of the livestock keepers. On the basis of livestock production systems, penology, topography and climate the province can be divided in six ecological zone, stated as coastal, deserted rangelands, highlands of the north of the province, Suleiman mountainous region, central Brahvi highlands and the hot region of Kachhi basin. There are 6 camel breed, 7 sheep breeds, 1 cattle breed, 4 goat breed and two donkey breed in the province. These breeds not only provide source of livelihood but also play role as companions. Livestock breeds are evolved with the precious indigenous knowledge, hence threat to the breeds is a threat to the indigenous knowledge also. The local animal genetic resources are the part of the socio cultural life of the keepers. Many traditions and customary laws articulate around the livestock breeds. Though, apparently there is no threat to the animal genetic resources of the province, moreover some camel breeds, i.e. Kharani, Raigi and to some extent Lassi are under threat. Brahvi camel of central highlands of the province is almost lost and very rare herds can be found. Still there are major problems and issues, which can be threat to such precious animal genetic resource in the long run of the time period. The major issue is the deforestation and removal of the vegetation cover. The second most important issue is the social changes in the life of the livestock keepers due to interventions in their production systems and around them, i.e. expanding but non sustainable agriculture. Epidemic diseases also causing a great threat to the livestock breeds of the region and in the recent years PPR and abortion caused heavy losses. The province is the cross road of the Afghan nomads who cross the province two times in a year and introduce many epidemic diseases in the region. They brought some diseases from the livestock of the central Asia, like PPR and Crimean Congo Hemorrhagic Fever (CCHF). The Government support and interest is very rare for the livestock keepers. The livestock keepers as in the other parts of the world are neglected and there is no share of livestock keepers in the research and development policies of the province.

It is the time to study the production potential of the indigenous livestock breeds keeping in mind all the drivers of its production system. Also, it is necessary to study their social systems and work out the changes and the factors responsible for these changes. Pakistan is the signatory of many important international conventions and treaties, i.e. MDGs, CBD, UNCCD, Right of Indigenous people, Climate Change and Global plan of action on animal genetic resources for food and

agriculture, hence it is necessary to respect these conventions and abide by the rights of livestock keepers. The NGOs sector can help in the mobilization of the livestock keepers for breeds associations, demonstration plots of reforestation of local varieties of vegetation, training for animal health and care, documenting of the indigenous knowledge and liaising for their rights.

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7. Annexure

A. Figures of the Report

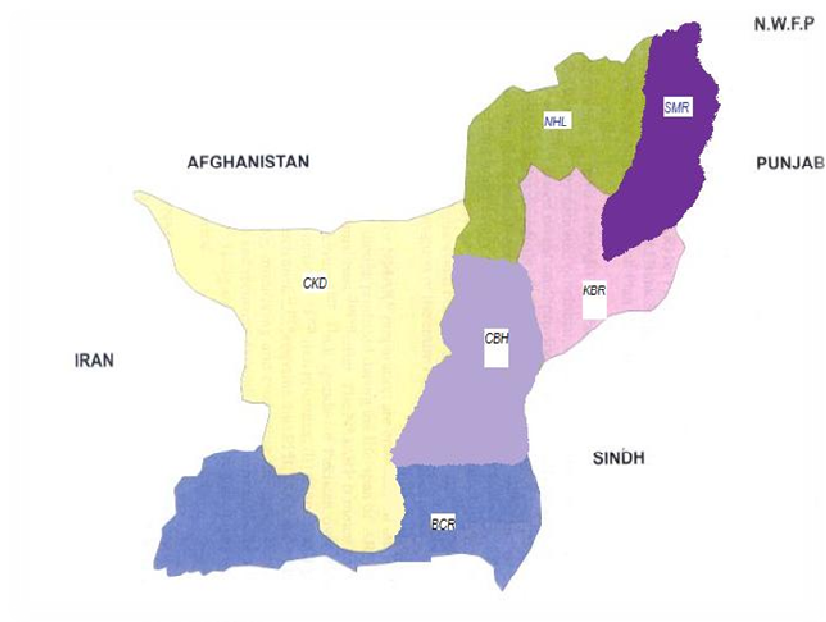


Fig. 1 Ecological zones of the province

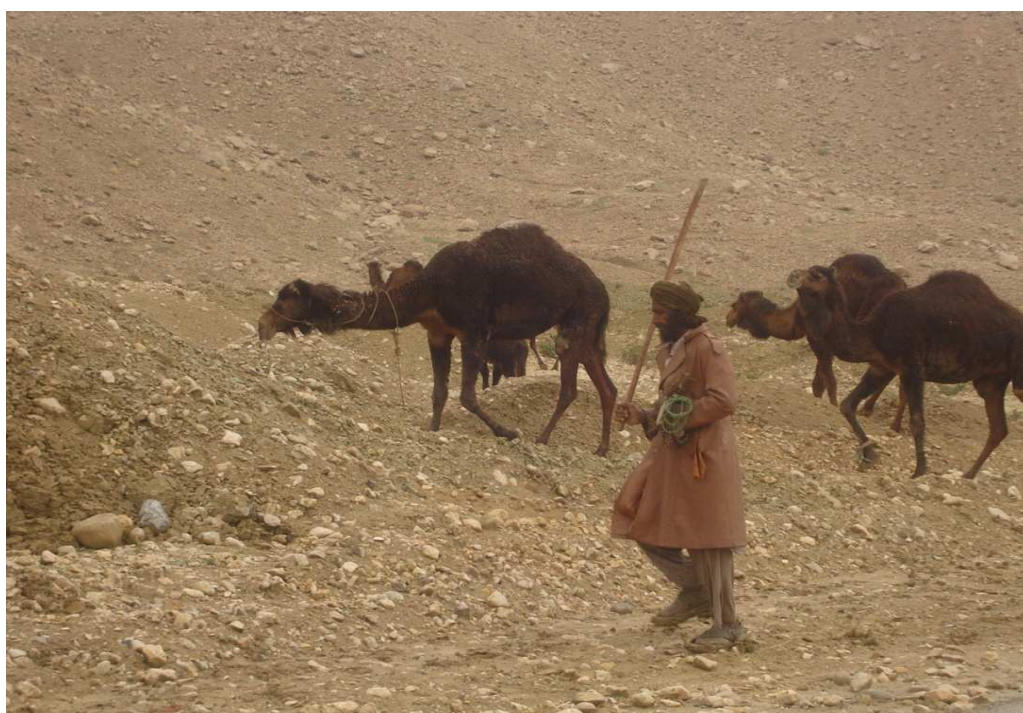


Fig. 2 Brahvi camel



Fig. 3 Jathnasal or Raidi camel



Fig. 4 Kharani camel



Fig. 5 Kohi camel



Fig. 6 Lassi camel



Fig. 7 Raigi camel



Fig. 8 Kajalle sheep



Fig. 9 Thor Ghuzi or Waziri sheep



Fig. 10 Kakari sheep



Fig. 11 Musakhaili sheep



Fig. 12 Bybrik or Marriwal sheep



Fig. 13 Dumeri sheep



Fig. 14 Mangeli sheep



Fig. 15 Berberi goat



Fig. 16 Kohi-Suleimani goat



Fig. 17 Khurasani goat



Fig 18 Morak breed of goat



Fig. 19 Kohi Suleimani cattle



Fig. 20 Shinghari donkey
S



Fig. 21 Sperki or Piddie donkey



Fig. 22 Participants of the feedback seminar

B. Tables of the Report

Table 1 Domestic animals produce in Balochistan

Type of Animal	Produce				
	Draught	Wool/Hair	Milk	Meat	Fat
Camel	+	+	+	+	+
Equines	+	–	–	–	–
Sheep	–	+	+	+	+
Goat	–	+	+	+	–
Cattle	+	–	+	+	–
Donkey	+	–	–	–	–

Table 2 Examples of special traits in the animal genetic resource of the province

Breed	Special Trait
Kohi camel	<i>Trypanosomiasis tolerance and called as Syyed by its keepers, means resistant to diseases</i> <i>White color is the genetic marker for high milk yield</i>
Gaddai camel	<i>Resistant to foot rots in cold wet weather, walks long and can exist in cold and wet weather</i>
Kohi Suleimani or Lohani cattle	<i>Resistant to tick fever and FMD. Consume fibrous bushes and climb mountains</i>
Jathnasal camel	<i>Heat tolerant (53 C°) and high within breed diversity</i>
Kajalle or Gosalli sheep	<i>The kal sakththa (resistant to dry year) and promising compensatory growth</i>
Dumeri or Hernai	<i>Sha khurgi (good in thriftiness)</i>
Balochi sheep	<i>Hard to water shortage like camel and hard to very high temperature (53 C°)</i>
Kharani camel	<i>High milk yielder in the harsh and hostile environment of the Chaghai Kharan desert</i>
Raigi camel	<i>Consistent milk producer with thick milk. Consume brackish water and bitter taste plants Artemisia sp.</i>

Kakari sheep	<i>Pa Akhur sha paie, Ghalla sha Khuri (Good response to grain/stall feeding), therefore use for Landi purpose. (The sheep meat is dried and eat in winter season)</i>
Shinwari or Shane Zarghone sheep	<i>Long walk ability makes it fit for Nomadism. More marbling meat makes it appreciable for Landi purpose and good response to grains</i>
Mangeli sheep	<i>Good scavenger, easy to graze on small pieces of land. Fit for agropastoralism</i>
Rakhshani sheep	<i>Hardy to drought years, high compensatory growth</i>
Khurasani goat	<i>Long walk making it fit for nomadism, high milk persistency (continue milking for more days with constant milk production)</i>
Kohi Suleimani goat	<i>High compensatory growth rate, tolerant to both high and low temperature.</i>
Morak	<i>Close to wild ancestors and produce milk in hard conditions</i>
Bhagnari	<i>Tolerate very high temperature of the Kachi basin region, changes color (white in summer and tan in winter)</i>
Balochi horse	<i>Digest roughages efficiently and do not need cereals in ordinary conditions</i>
Shinghari donkey	<i>Highly resistant to dry years</i>

Table 3 Biometric parameters of the Brahvi breed (cm)

Body measurements	Male	Female	Mean
Head Length	39.48	39.19	39.25
Head Width	20.14	19.75	19.87
Wither Height	166	164	165
Thoracic Girth	175	173	174
Abdominal Girth	212	236	224
Tail Length	49	47	48
Ear Length	12	12	12
Ear width	7	7	7

Neck Length	92	90	91
Rump Length	142	140	141
Estimated Weight	307	334	320.5

Table 4 Reproductive and productive Traits of the Brahvi breed

No	Traits	Values	
		Male	Female
1	Average birth Weight	48 kg	46 kg
2	Average weaning Weight*	160 kg	150 kg
3	Ready for workload	3 yr	3 yr
4	Use for heavy duty	7-8 yr	Not use for heavy duty
5	Age of puberty	4 yr	3 yr
6	Average work life	25 yr	-
7	Average reproductive life	20 ye	20 yr
8	Conception rate out of herd	-	40-50 %
9	Gestation period	-	375-386 day
10	Calving rate out of herd	-	40-45 %
11	Calving interval	-	2 yr
12	Average milk production	-	7 kg/day
13	Lactation length	-	8-11 month
14	Wool Production	-	3.5 kg

Table 5 Biometric parameters of the Jathnasal breed (cm)

Body measurements	Male	Female	Mean
Head Length	44	43	43.5
Head Width	20	20	20
Wither Height	187	185	186
Thoracic Girth	208	206	207
Abdominal Girth	263	272	267.5

Tail Length	52	50	51
Ear Length	12.5	13.5	13
Ear width	6	6	6
Neck Length	97	90	93.5
Rump Length	155	152	153.5
Estimated Weight (kg)	598	707	652.5

Table 6 Reproductive and productive Traits of the Jathnasal Camel

No	Traits	Values	
		Male	Female
1	Average birth Weight	60 kg	57 kg
2	Average weaning Weight [*]	180 kg	170 kg
5	Ready for workload	3 yr	3 yr
7	Use for heavy duty	7-8 yr	-
8	Age of puberty	4 yr	4 yr
9	Average work life	25 yr	-
10	Average reproductive life	25 ye	25 yr
11	Conception rate out of herd	-	45-50 %
12	Gestation period	-	375-386 day
13	Calving rate out of herd	-	40-45 %
14	Calving interval	-	2 yr
15	Average milk production	-	12 kg/day
16	Lactation length	-	8-11 month
17	Wool Production	-	2 kg

Table 7 Biometric parameters of Kharani breed (cm)

Body measurements	Male	Female	Mean
Head length	40	39	39.50
Head width	20	19.50	19.25
Weather height	175	175.5	19.75
Thoracic girth	197	202	175.25
Abdominal girth	231	250.7	199.5
Tail length	60	54.7	240.85
Ear length	11	11	57.35
Ear width	6.5	6.7	11
Neck length	90	96.2	6.6
Rump length	143.5	146.9	93.1
Estimated weight	398	444	145.2

Table 8 Reproductive and productive traits of the Kharani Camel

No	Traits	Values	
		Male	Female
1	Average birth Weight	30-40 kg	31 - 35 kg
2	Average weaning Weight *	165-180 kg.	155 - 180 kg
5	Ready for workload	3 yr	3 yr
7	Use for heavy duty	7-8 yr	-
8	Age of puberty	4 yr	2.5-3 yr
9	Average work life	25 yr	-
10	Average reproductive life	25 ye	21 yr
11	Conception rate out of herd	-	50-53%
12	Gestation period	-	375-386 day
13	Calving rate out of herd	-	45-50%

14	Calving interval	-	2 yr
15	Average milk production	-	17 kg/day
16	Lactation length	-	10-12 month
17	Wool Production	-	2 kg

Table 9 Biometric parameters of the Kohi breed

Body measurements	Male	Female	Mean
Head length	42.23	34.16	38.20
Head width	22.60	20	21.3
w.H	176.61	176.13	176.37
T.G	206	207.86	206.93
A.G	234.15	241.5	237.825
TL	50.88	48.10	49.49
EL	12.04	11.77	11.905
EW	6.63	6.99	6.81
NL	88.85	86.18	87.515
BL	140	141.25	140.63
Est. wt	440.69	439.30	439.995

Table 10 Reproductive and productive and traits of the Kohi Camel

No	Traits	Values	
		Male	Female
1	Average birth Weight	32 – 40 kg	31 - 40 kg
2	Average weaning Weight*	160 - 185 kg	155 - 180 kg
5	Ready for workload	3 yr	3 yr
7	Use for heavy duty	7-8 yr	-
8	Age of puberty	4 yr	3 yr

9	Average work life	25 yr	-
10	Average reproductive life	25 ye	21 yr
11	Conception rate out of herd	-	50-53%
12	Gestation period	-	375-386 day
13	Calving rate out of herd	-	45-50%
14	Calving interval	-	2 yr
15	Average milk production	-	10.7 kg/day
16	Lactation length	-	8-11 month
17	Wool Production	-	2.5 kg

Table 11 Biometric parameters of the Lassi breed

Body measurements	Male	Female	Mean
Head Length	40.40	39.19	30.80
Head Width	20.00	19.30	19.70
Wither Height	169.50	167.30	168.4
Thoracic Girth	173	169.50	171.25
Abdominal Girth	219	237	228
Tail Length	46	48	47
Ear Length	10	10	10
Ear width	7	7	7
Neck Length	98	96	97
Rump Length	166	166.8	166.40
Estimated Weight	322	343	332.50

Table 12 Reproductive and productive traits of Lassi camel

No	Traits	Values	
		Male	Female
1	Average birth Weight	35 – 40 kg	31 - 37 kg
2	Average weaning Weight *	175 - 185 kg	160 - 170 kg
5	Ready for workload	3 yr	3 yr
7	Use for heavy duty	7 yr	-
8	Age of puberty	4 yr	3 yr
9	Average work life	20 yr	-
10	Average reproductive life	20 ye	21 yr
11	Conception rate out of herd	-	50-50 %
12	Gestation period	-	375-386 day
13	Calving rate out of herd	-	45-50%
14	Calving interval	-	2-3 yr
15	Average milk production	-	6-7 kg/day
16	Lactation length	-	9-11 month
17	Wool Production	-	2.5 kg

Table 13 Biometric parameters of Raigi breed

Body measurements	Male	Female	Mean
Head Length	39.48	39.19	39.25
Head Width	20.14	19.75	19.87
Wither Height	165.67	163.93	164.34
Thoracic Girth	175.33	173.5	174.415
Abdominal Girth	210	237.3	223.65
Tail Length	49.10	47.21	47.67

Ear Length	11	10.99	10.99
Ear width	5.95	5.99	5.98
Neck Length	82.76	76.14	78.49
Body Length	139.33	139.27	139.3
Estimated Weight	337.58	384.90	439.995

Table 14 Reproductive and productive Traits of Raigi camel

No	Traits	Values	
		Male	Female
1	Average birth Weight	30 kg	33 kg
2	Average weaning Weight*	140 kg	160 kg
5	Ready for workload	3 yr	3 yr
7	Use for heavy duty	7 yr	-
8	Age of puberty	3.5 yr	3 yr
9	Average work life	20 yr	-
10	Average reproductive life	15 ye	21 yr
11	Conception rate out of herd	-	50-53%
12	Gestation period	-	375-386 day
13	Calving rate out of herd	-	50-55%
14	Calving interval	-	2-3 yr
15	Average milk production	-	7 kg/day
16	Lactation length	-	10-12 month
17	Wool Production	-	3 kg