

# Potential Use and Utilization by Rural Communities of *Acacia Jacquemontii* As Animal Feed In the Thal Desert

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**Abstract:** Ranges are very imperative natural assets for livestock production in Pakistan. About two third area of the country is under rangelands. In distant rural areas of the country, livelihood of the majority of the graziers depended upon the practice of livestock grazing on range vegetation. Overgrazing and mismanagement of these renewable resources have severely deteriorated their potential. In order to remove the range conditions and enhance the livestock production, it was very fundamental to address and manage the grazing problems faced by the rural communities. Therefore a study was designed to assess potential use and utilization by rural communities of *Acacia jacquemontii* as animal feed in the Thal desert. In this study the local, graziers in the rangelands of Districts Layyah (Choubara site and Kharewala site) and Bhakkar (Northern Dagar Kotli site and Southern Dagar Kotli site) were interviewed through an interview schedule. The data collected was analyzed statistically for objective conclusion as: on total averages basis about family size ranged from 9 to 12. The illiteracy level was 36, 32, 52 and 56 percent in 1st, 2<sup>nd</sup>, 3<sup>rd</sup> and 4th locations respectively. The sources of feeding for livestock in rangelands were natural vegetation in the form of grasses, bushes, shrubs and trees. On average basis 100 percent graziers of all categories used emergency feed.

**Key words:** *Acacia*, Literacy level and Occupation of the graziers, Feeding Behavior

## INTRODUCTION

Thal desert in Pakistan comprises of about 2.5 million hectares in the Punjab Province. It lies between 71.07 °E and 31-33 °N latitude at an altitude of 200 meters. This desert is generally consisted of the districts Bhakkar, Layyah, Mianwali, Muzaffargarh and some parts of

Sargodha, Khoshab, and Jhang districts. About 32 % of Thal is comprised of grazing lands. Around about 50-60 % of this desert area is under sand dunes and the remaining of the area is almost in level conditions (Quraishi *et al.*, 2006).

In winter season the temperature of the Thal area goes down up to 0 °C and rises up to 44 °C in summer season of the year. Strong winds are very frequent which cause severe soil erosion. The soil is moderately calcareous, alkaline clay loam and alluvial with sandy texture (Sultani *et al.*, 1985). Main flora of Thal range areas consist of shrubs and bushes rather than grasses or herbs. Common shrubs of this desert are *Acacia jacquemontii*, *Calligonum polygonoides*, *Capparis decidua*, *Haloxylon recurvum*, *Prosopis cineraria*, *P. juliflora*, *Solvadora oleoides*, *Sudea fruticosa* and *Tamarix aphylla* (Quraishi *et al.*, 2006).

*Acacia* species are frequently present in Australia while widely distributed everywhere and spread around the tropical and subtropical regions of the world. *Acacia* species are commonly adapted to the dry environment (Heil *et al.*, 2004). In the desert landscapes species have wild growth and are drought tolerant. These species particularly play a vital role in the form of nitrogen fixation, sand dunes maintenance, and provision of shade / shelter to grazing livestock and wildlife, and are the source of forage, fuelwood, timber and medicinal goods in desert rangelands. (Aref *et al.*, 2003).

*Acacia jacquemontii* Benth locally known as Bable, is one of the supreme valuable multiuse shrub of arid and semi-arid areas of Thal, D. G. Khan, Cholistan, and Pothowar in Pakistan. It is hardy in nature and well-adjusted to the severe climatic conditions. It is an excellent source of fuel, forage, browse, gum tannin, small poles and has numerous medicinal uses for livestock as well as for human beings (Rao and Chaudhary, 2002). The exceptional sand binding capability due to copious root organization makes it potential species for

sand dunes stability. Baskets and other household articles are made from young shoots and branches of this shrub. Wood yields excellent quality charcoal which is used in making gun powder. Each plant of this shrub yields 100-150 g edible gum which is highly priced in pharmaceuticals (Chaudhary *et al.*, 2009). Its dried thorny branches are used as fence whereas the bark is used in small sized tanneries for imparting black or brown paint to the leather (Mertia *et al.*, 2009).

Lack of conservation efforts and heavy removal of this shrub by local people have become a great threat for the existence and survival of this species. In spite of its high significance, very little research work has been done on this shrub in the world. Need of the time is to study and conduct more research on this threatened plant species. Therefore a study on this species in Thal desert area was conducted with following main objectives.

- To assess the socio-economic conditions of graziers.
- To assess the acceptance of this species by ruminants.

## MATERIALS AND METHOD

### Description of the Study Area Thal

Thal desert in Pakistan consist of about 2.5 million hectares. It comprise of districts of Mianwali, Bakkhar, Layyah, Muzaffargarh and some parts of Sargodha and Jhang districts in the Punjab Province of the country. The wide spread natural woody vegetation of this desert consists of drought shrubs and trees like *Calligonum polygonides*, *Capparis deciduas*, *A. jacquemontii*, *Prosopis juliflora*, *Salvodora oleoides*, *Suedea fruticosa*, *Ziziphus mauritiana*, *Tamarix aphylla*, *Prosopis cineraria*, *Haloxylon recurvum* (Quraishi *et al.*, 2006). The soil of the desert is moderately calcareous, alkaline, clay loam and alluvial with sandy texture. About cover 50-60 % of Thal area is under sand dune (Sultani *et al.*, 1985)

The study was undertaken in Thal rangelands.

- To assess the socio-economic conditions of graziers.
- To know what changes in economic conditions of graziers, herd size and type of vegetation, occurred over the time and to assess the potential of grazing on *Acacia jacquemontii*, and to suggest suitable measures in the light of findings in favor of graziers/ local dwellers.

For this purpose, the study was carried out in rangelands of Rakh Choubara and Rakh Kharewala sites of district (Layyah) and Southern Dagar kotli and Northern Dagar kotli sites of district (Bhakkar) in the Punjab Province. Maps and other relevant information of the district was collected from District offices of Agriculture and Forest departments. The interview schedules were prepared to collect to required information from the graziers who mostly depended on gazing animal as their major source of income. After given a final shape of interview schedule for data collection. A field survey was conducted in (Districts of Layyah and Bakkhar) and number of villages and settlements were identified. In this study 100 graziers was selected randomly from 8 village near the selected study sites.

The purpose of this categorization was to assess and to know the changes of socio-economic condition of graziers of each category. Thus the data from 100 graziers was collected and properly analyzed. The data thus collected was transferred to tally sheets then tabulated and analyzed statistically.

## RESULTES

### 1. Average family size

The results comprising the family size of four locations in two districts (Layyah and Bakkhar) are presented in table 1. The average family size was found to be 11, 14, 9 and 12 in Choubara, Kharewala, Northern Dagar Kotli and Southern Dagar Kotli sites respectively. The average family size ranged from 9 to 12.

### 2. Literacy level of the graziers

The data representing the literacy level of four locations in two districts (Layyah and Bakhar) is shown in table 1. It is clear from the table that the illiteracy level was 36, 32, 52 and 56 percent in 1st, 2<sup>nd</sup>, 3<sup>rd</sup> and 4th locations respectively. Majority of the people were educated up to primary level and could only read and write. The reasons of higher level of illiteracy might be as follows:

### 3. Occupation of the family members

The data shown in Table 2 depicts different occupations of the graziers living in Thal range at four sites in two districts Layyah and Bakhar. Majority of the graziers were found to be busy in agro grazing as their major source of income. About 71.20 percent graziers of the Choubara site were observer busy in this occupation. They had other occupations as farming (22.45%), business (6.99%), grazing hours (10 %) and average distance travelled (12 km) daily for grazing and doing field work. On the other hand Kharewala location, again the major occupation of these people was agro grazing the other (69.35%) while other occupations such as farming, business,

grazing hours and average distance traveled remained as 16.35, 3.75, 8 percent and 9 km respectively. Similarly the graziers of Northern Dagar Kotli site were having agro grazing too as their major occupation (70.32%) while they took interest in the farming, business, grazing hours and average distance traveled as 15.38, 4.76, 9 percent and 10 km respectively. The graziers of Southern Dagar Kotli site were having agro grazing too as their major occupation (67.76%) while they took interest in the farming, business, grazing hours and average distance traveled as 8.78, 1.21, 9 percent and 8 km respectively.

#### 4. Average livestock number

The data regarding number of different animals reared per herder are given table. 2. The average number of livestock kept per herder in Choubara, Kharewala, Northern Dagar Kotli and Southern Dagar Kotli sites were 30.61, 59.97, 129.91 and 112.68 respectively. It was noted that graziers of all locations were mostly keeping sheeps and goats.

#### 5. Parts used of *Acacia jacquemontii* plants feeding livestock during spring and summer seasons

The data regarding Parts used of *Acacia jacquemontii* plants feeding livestock during spring and summer seasons are shown in table 3. It was concluded that parts used of bable acacia plants feeding livestock during spring level of satisfaction (leaves/ twigs) browsed by goat at four sites viz Choubara, Kharewala, Northern Dagar Kotli and Southern Dagar Kotli sites were investigated 19 (5/4), 22(5/4), 17(6/4) and 13 (7/4) % belly full respectively while level of satisfaction of belly full browsed by camel were found 8(12/4), 6(17/4), 5(20/4) and 3(34/4) percent respectively. The same results concluded during summer season level of satisfaction (leaves/ flowers/ pods) browsed by goat at same above mentioned sites were given 20(5/4), 16(6/4), 19(5/4) and 13(8/4) percent and browse level of satisfaction of belly full by camel at same above mentioned season were found 7(14/4), 4(25/4), 9(11/4) and 6(17/4) percent respectively. It was concluded that dependence of livestock for browse only on *A. jacquemontii* plants could not be fulfilled their dietary requirements.

#### 6. Feeding of livestock during drought season:

The data regarding the feeding of livestock during drought season are given table 3. It was concluded from the study that there were two major factors responsible for feed storage i.e. severe weather conditions and diseases. On average basis 100 percent graziers of all categories used emergency feed. In the research area the expected drought was observed in the months of January,

February and then May-August. The graziers belonging to all four sites used wheat, gram and gawara straw, Wanda, oil, oil seed cake, gram, hay and tree leaves to feed their livestock in order to overcome the feed deficiencies. About 100 percent of the graziers of all these four areas used concentrated feed during emergencies.

## DISCUSSION

The reason for their large family size might be due to low literacy rate and earlier age marriages. In village large family is considered as sign of power. So dire wish for sons is another reason for large family size. Similarly, the religious factor also contributed in population explosion. The sex ratio in the family size was 55 to 60 percent male. The number of children varied from 2 to 5 in all locations. These findings were contradictory with the findings of Bajwa (1988) who reported that sex ratio in Pubby hills was 51.65 male and 48 percent female but were in line with the findings of Azam (1991) who reported male 61 percent and female 38 percent in district Bahawalpur.

The traditional trend of the people to their young ones in grazing and unskilled agriculture labor etc. from the early childhood. The poverty of the villagers also compelled their children to financially help the family by grazing the herds, laboring in the agriculture farms, collection of wood for fuel purpose or learning of other technical works such as working in cotton mills and shoe making etc. Scarcity of resources and educational infrastructure. The result of the author supported by the finding of Bajwa (1988) who found 79.1 percent illiteracy level in Pubby hills but disagreed with the finding of Azam (1991), Shahid (1992) and Naseem (1991) who found 100 percent illiteracy level in their research areas. Nowadays, school master is abroad in Pakistan, this is the reason behind the slightly higher literacy rate as compared to the finding of Bajwa (1988).

It is cleared from this discussion that majority of the graziers of all categories took keen interest in agro grazing as their major occupation while the other business were taken as minors. The reason was that there were conducive environment for rearing livestock. As the average distance traveled by the livestock was concerned, it ranged between 8-12 km /day while the average grazing hours varied from 8-10 per day. The result coincided with the findings of Petit (1972) who reported that average grazing hours of cows were 8 hours/day. Nobody was found engaged in any other business such as farming, mill laborer and government or private services in the region of villages along range and forest side.

This might due to high potential for utilizing inferior kind of vegetation then other

animals. Molenat *et al.* (1983) also pointed out during their study in France that on dry unproductive area potential of grazing was higher in sheep than in baroque.

Due to their early return and short life cycle graziers prefer to keep small ruminants (sheep and goats) as compared to large ones (buffalos, cows and camels). The results of the author more are less coincide with the findings of Ishaque (1985) who reported 50 animals as an average size of herds. The findings disagreed more or less with the finding of Naseem (1991) with the difference in number is attribute to difference in physiography and natural vegetation of Thal and Multan.

During the scarcity in drought years, the foliage and pods are threshed out and used as fodder for goats these finding might be similar results by Bhandari (1990). The foliage of this species is fairly rich in all macro and micro minerals nutrients and sustained feeding animals during droughty season of fodder these results could be matched with Dhir *et al.* (1984) Sharma *et al.*, (1984).

The bark of the *Acacia jacquemontii* is a good source of tannins investigated by Bhandari (1990). Whereas in Thal desert inhibitors of that areas could not be used as a source of income due to unawareness of the importance of this shrub by local communities and lack of such tanning industries in the surroundings. The gum produced by this species is edible and highly priced in pharmaceutical industries the finding were given by Harsh and Bohra (2006) due to because of unawareness of local inhibitor could not be used the gum of this plants for any medicinal and generate as the source of income.

As a firewood this species is an excellent material. It has gradual burning property, which enables the firewood to burn for longer duration. On burning the wood gives out intense heat and therefore, preferred by the gold, silver and iron smiths these results might be similar findings by Bhandari (1990). Depending on length and thickness of poles, local villagers use them for various purposes. The local inhabitants cut the plants from ground levels to get poles and above ground biomass. The poles with the height of 2-3 meter and thickness of 40 mm or more were preferred by local villagers for making frames of roofs of their houses and huts these results shown similar with finding of by Bhandari (1990) and Choudhary *et al.*, (2009).

### Conclusion

From this study it was concluded that if the government provide assistance in terms of grant, veterinary facilities and land for their own fodder

production, this important sector of open grazing in Thal desert will flourish and be able to play a pivotal role for producing animals of improved breeds and their products. The full potential of *Acacia jacquemontii* has not been harnessed considering its multiple uses, profuse growth habit and adaptation to extremely difficult and harsh conditions. If efforts are not made to raise man-made plantations, this valuable species may disappear from its natural habitats due to overexploitation and excessive biotic pressure. Its extinction would not only imbalance the desert ecosystem and floral diversity, but also take away an important means of desert dwellers for sustaining their lives particularly in difficult times of drought and famines. For protection and conservation of *Acacia jacquemontii* in its natural habitat, and harnessing its full biomass production potential for benefit of community, following recommendations are put forth:

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**Table 1: Average family size and Literacy level of the graziers at four sites in Thal Desert**

Locations	Family members/gender				Literacy level				
	Male	Female	Children	Average size	Illiterate (%)	Primary (%)	Middle (%)	Matric (%)	Higher (%)
Choubara site	4	3	4	11	36	24	20	16	4
Kharewala site	3	4	5	14	32	22	16	20	8
Northern dagar kotli site	4	3	2	9	52	16	12	8	12
Southern dagar kotli site	5	3	4	12	56	20	8	12	4

**Table 2: Occupation of the family members and Average livestock number reared per Respondent**

Locations	Occupation of the graziers					Kinds of animals					
	Open grazing (%)	Farming (%)	Business (%)	Grazing hours (%)	Average distance traveled km	Sheep	Goats	Cow	Camel	Buffaloes	Ave. Total herd size
Choubara site	71.20	22.45	6.99	10	12	8.32	18.85	2.32	1.04	0.08	30.61
Kharewala site	69.35	16.35	3.75	8	9	12.16	45.12	1.64	0.44	0.61	59.97
Northern Dagar Kotli site	70.32	15.38	4.76	9	10	42.08	81.92	3.72	1.43	0.76	129.91
Southern Dagar Kotli site	67.76	8.78	1.21	9	8	33.96	58.48	18.12	1.16	0.96	112.68

Table. 3. Feeding of *Acacia jacquemontii* of livestock during different seasons

Locations	Parts used of <i>Acacia jacquemontii</i> plants feeding by livestock				Feeds in drought season to the livestock by local people		
	Spring season		Summer season		Animals	Dec-Jan	May-June
	Goat	Camel	Goat	Camel		Duration 4 month	
	Level of satisfaction leaves/twigs		Level of satisfaction leaves/flowers/mature pods				
<b>Choubara Site</b>	19% 5/4 belly full	8% 12/4 belly full	20% 5/4 belly full	7% 14/4 belly full	Sheep Goat Cow Camel Buffalo	Wheat, gram and gawara straw, wanda, oil, oil seed cake, gram hay	
<b>Kharewala Site</b>	22% 5/4 belly full	6% 17/4 belly full	16% 6/4 belly full	4% 25/4 belly full	Sheep Goat Cow Camel	Wheat, gram and gawara straw, wanda, oil, oil seed cake, gram hay	
<b>Northern Dagar Kotli Site</b>	17% 6/4 belly full	5% 20/4	19% 5/4 belly full	9% 11/4 belly full	Sheep Goat Cow	Wheat, gram and gawara straw, wanda, oil, oil seed cake, gram hay	
<b>Southern Dagar Kotli Site</b>	15% 7/4 belly full	3% 34/4 belly full	13% 8/4 belly full	6% 17/4 belly full	Sheep Goat Cow Camel	Wheat, gram and gawara straw, wanda, oil, oil seed cake, gram hay	