Value chain analysis with a Gender Focus

On Food Crop, Cash Crop and Livestock
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1. Introduction

Gender relates to socially assigned roles and behaviors attributable to men and women, it is the socially constructed meaning of biological sex differences. The construction and reproduction of gender takes place at the individual and at the societal level (Council of Europe 1998). Gender roles are roles that are played by both women and men and which are not determined by biological factors but by the socioeconomic and cultural environment or situation (ICA-ILO 2001, Mollel and Mtenga 2000). It is culture specific and therefore dynamic in time and space. Policies and structures have been found to play a very important role in shaping the condition of life and often institutionalize the social structures (Council of Europe 1998, Alesina et al 2012). Structure refers to the political, cultural, economic and social constructions and norms that shape agriculture and women’s daily lives; they can serve as vehicles for women’s advancement, or constrain women (Davis 2012).
Gender affects the distribution of resources, wealth, work, decision-making, political power as well as the enjoyment of rights and entitlements within the family and in public life (Welch et al. 2000).

Women from poor households engage in a variety of income-generating and expenditure-saving activities. In some cases, these activities supplement the contribution by males while in others they are the primary or the sole source of household livelihoods (Kabeer 2003).

Due to the important role women play in agriculture, addressing gender issues is central in increasing productivity thus enhancing livelihoods. Since the 1990’s gender mainstreaming has been used as a strategy to address the gender issues in development, agriculture being one of them. Gender mainstreaming has been noted not to be a game for a single player, but calls for close cooperation between people and organizations (Ministry of Foreign Affairs, Netherlands 2002). It should target major institutions [and policy levels] and focus on gender relations (UN 2002, Farnworth 2013). According to the Ministry of Foreign Affairs, the Netherlands (2002), the drive to reduce poverty is linked to the problem of redistributing resources and any redistribution must benefit women since they are often the poorest members of society. Land, a major factor of production in agriculture, remains a resource where redistribution is important to enhance the production by the more than half of agriculture producers, the women. While Gender equality is the goal; gender mainstreaming is the strategy (UN 2002).

Gender continues to lack significant visibility in statistics for agriculture and rural areas Ahearn (2010). The dry-land systems programme of ICRISAT therefore puts gender at the centre of its work to ensure that relevant gender information is obtained and gender issues are addressed to increase production, hence food security as well as the agricultural economy. This research will therefore explore the contributions of men and women in the Pearl Millet, Cluster Bean, Moth Bean (Moth) and Goat rearing value chains, the differential access and control over resources and the rewards thereof. It will also identify the typology of farmers involved in the cultivation and production and goat rearing. It also gives a view into the gender relations in these typologies in two dryland villages of Western Rajasthan in India- Govindpura and Dokh.

This study seeks to examine and investigate the specific contributions of women and men in value chains of one food crop, one cash crop and livestock in the dry-lands of western Rajasthan in India.

2. The Study
2.1. **Objective of the study**

The objective of the study is to conduct value chain analyses for understanding livelihoods with special focus on gender roles (both men and women) at different stages of the value chain in two villages such as Govindpura and Dhok in Rajasthan - from inputs to market in the following.

1. **Food crop** – Pearl Millet (Bajra/Pennisetum Glaucum),
2. **Cash crop**- Cluster Bean (Guar/ Cyamopsis Tetragonoloba),
3. **Cash crop** - Moth Bean (Moth/ Vigna Aconitifolia)
4. **Livestock** – Goat rearing

This study is conducted by taking two-step approach

- Literature survey and tool designing
- Village stay, study and collection of relevant data from primary and secondary sources.
- Analysis of collected data and presentation of report.

2.2. **Research question**

In the study, we designed questions to map the poor participation of women in the value chain. The questions are as follows.....

Who approaches for climate information (M/F/Both)?

Who approaches for crops information (M/F/Both)?

Who approaches for agriculture inputs such as seeds, fertilizers and pesticides information (M/F/Both)?

Who approaches for marketing crops (M/F/Both)?

Who approaches for livestock purchase and sale information (M/F/Both)?

2.3. **Methodology**

**Methodology**

A variety of methods and tools were used for the study. These included literature review, Participatory Rural Appraisal (PRA) and Livelihood Enhancement Action Plan (LEAP) tools and Value Chain Analysis (VCA).

At the beginning of the study, literature review on women, rainfed agriculture and value chain was undertaken across the globe in order to incorporate important learning from different studies. A note “Gender in value chain analysis” was prepared and shared with all the team members.

The following framework was kept in mind while designing the questionnaire and conducting the study.

1. The gender dimensions framework examines four intersecting dimensions of social life:
   - Observed practices and patterns of participation,
   - Existing patterns of access to productive assets,
   - Social beliefs and perceptions, and
   - Laws, policies, and institutions.

2. Mapping men and women participation and benefits along the value chain.

3. Identifying the factors that shape current gender roles and relations in value chain operations.

Literature review was also done to gather secondary information of the area and study sites as well as for the information on the crops and livestock. For primary data from the field various PRA and LEAP tools were used for the study (see table 2 below). ALPL has also developed an in-house VCA tool which was discussed in the team for application.

2.4. **Study team**

12 member’s study team from Akshara has been involved in this study. (For study team details see page no: 73) As part the team two professional, familiar with local area have been involved in the field work particularly staying in the villages for 30 days. In the team with help of local youth identified household and completed field work. An NGO, Gramin Vikas Vigan Samiti (GRAVIS) a local partner of ICRISAT has also supported in facilitating in field work.

Filed work was monitored on daily basis by livelihood professionals from ALPL through phone, e-mails. A team of three professionals from Hyderabad and one from New Delhi visited the
They ensured the collected data is in order with the objective of the study and completion of spill over work.

<table>
<thead>
<tr>
<th>Table 1: Sample details in Dhok and Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dhok</strong> – 47 households</td>
</tr>
<tr>
<td>35 households in the sample identified by ICRISAT</td>
</tr>
<tr>
<td>12 households in the sample identified by study team</td>
</tr>
</tbody>
</table>

**Division of household**

<table>
<thead>
<tr>
<th></th>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female headed</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Male headed</td>
<td>44</td>
<td>30</td>
</tr>
</tbody>
</table>

**Note:** ICRISAT has provided the list of sample households for both villages. These households are the beneficiaries of the seed support given by ICRISAT through GRAVIS. Our team identified additional households based on different criteria like caste, women headed family and land holding size.

Other important informants/respondents of study in the villages:

*For sample household details, refer Annexure C (Table No: 4 and 8).*
Table 2: Tools used in the study

<table>
<thead>
<tr>
<th>Tools</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transect walk</td>
<td>To get basic idea about the village</td>
</tr>
<tr>
<td>Village stay</td>
<td>Study resource person stayed in the village for understanding the village by observation and rapport building with the villagers before starting the use of study tools.</td>
</tr>
<tr>
<td>Household questionnaire</td>
<td>To get insights about roles of the men and women and into the gender relation within the HHs</td>
</tr>
<tr>
<td>Social map</td>
<td>The social map of the village captures the social structure of the village – household details, caste-wise details, landless families, vulnerable people (elders, disabled, chronically ill), etc. Apart from this, the social map also portrays the resources available in the village including physical infrastructure, institutions, CBOs, housing pattern, drinking water facilities, caste-wise details, livestock, PDS, ration cards, etc. Social mapping of the village is done with the community, for the entire locality. The social map is drawn on the ground in the gram panchayat of the village. The community members are encouraged to draw the social map. While doing the social map the facilitator should make sure all the communities in the village are represented and participate in the process. Since social mapping is a lengthy process, community members should be encouraged and prepared to spend the required time and energy.</td>
</tr>
<tr>
<td>Resource map</td>
<td>Details regarding the land, soil, crops, horticulture, water bodies, roads, forests and trees, Common property resources etc in and around the locality are captured in the resource map. Like the social map, the resource map is also done in consultation with the community.</td>
</tr>
<tr>
<td>Livelihoods mapping</td>
<td>Livelihoods mapping is employed to get a picture of all the livelihoods practiced in the locality through focused group discussion. The entire range of livelihoods—farm, allied and non-farm activities are captured.</td>
</tr>
<tr>
<td>Income and expenditure analysis</td>
<td>Income and expenditure analysis of three different poor families are captured by individual interviews. This helped in understanding the annual income and spending</td>
</tr>
</tbody>
</table>
### Traded-In and Traded-Out (TITO)

TITO is done to understand the products and services going out and coming into the locality, both for consumption as well as productive activities. This analysis is done in group discussions and interaction with local traders.

### 24 Hour analysis

This tool is employed to understand what a typical day of the sample household looks like. It shows how much time is spent on multiple income generation process, which is done parallel to the primary source of income. The routine of the women and men members are looked at separately.

### 365 Days analysis

An insight into the number of days/months the individuals of the sample are engaged in employment. It also helps to understand the time spent on primary and secondary occupations, number of working days in each season etc. It is also helpful to identify the days during which the village is left with no work.

### Credit analysis

This tool helps in knowing the sources available for the people to take the credit like banks, cooperative societies, money lenders, SHG’s, traders etc and the interest to be paid and the reasons for taking the credit and also the terms and conditions. This is obtained in the focus group discussion with the villagers.

### Institution analysis

With the help of the community identify the institutions in the locality including banks, Community Based Organizations, library, anganwadi centers, hospitals, etc. and their membership. Also capture the accessibility of these institutions in the community.

### Seasonality

Through small group discussions, the facilitators gathered information regarding the seasonality of employment, diseases, credit, festivals in a year. This is useful in capturing the village condition.

### Focused Group Discussion (FGD)

After identifying and gathering respondents from the village, a focused group discussion is conducted with several groups - farmers, women, youth, labor and mixed group.

In these meetings, we were putting forward some specific issues like changing climatic conditions, changes in livelihoods, situation of women, and non-farm work availability etc for general discussion and allowed them to express their views and if possible arrive at a consensus among themselves. Most of the villagers generally took active part in these meetings. The consensus emerging was the source of concrete data for us. We also triangulated lot of information during these discussions.

Significant information regarding the depleting ground water, problems of de-silting of the village tank, problems faced by the laborers in getting work and MGNREGS etc came out in these discussions.
**Interaction with village elders**

<table>
<thead>
<tr>
<th>Interaction with village elders</th>
<th>Village history, important events that took place in the village, changes happened in the village circumstances in various aspects.</th>
</tr>
</thead>
</table>

**Value Chain Analysis (VCA)**

<table>
<thead>
<tr>
<th>Value Chain Analysis (VCA)</th>
<th>Identification of the respective food crop, cash crop and livestock is done based on the field observation and LEAP tools Livelihood mapping, Traded-In and Traded-Out, household level questionnaire and discussion with village groups with special focus on gender role in every stage of value chain.</th>
</tr>
</thead>
</table>

Information received from the village level tools and sample tools is used in analyzing the village livelihood conditions.

### 2.5. **Constraints**

In both the study villages, the community lives in a scattered manner. The ones, who own land, live close to the agriculture field. The general terrain of the area is rocky and sandy soil, making it difficult to commute from one place to the other.

Houses in Govindpura are located in their agricultural fields and thus are scattered within one to two kilometer distance from each other. Physical distance between the households became a hurdle for identification of the respondents in the given sample and filling questionnaire in stipulated time period.

Some houses in Dhok are located in the main village and some are scattered in to small groups of three to four households. Dhok being located near the Pakistan border and no previous research studies that have taken place in the village, initial interaction with the villagers became difficult. Hence they were reluctant to allow an unknown person to stay in their village.

The study was conducted during agriculture season and villagers were engaged in their livelihood activities. This, coupled with the physical distance between the households made it difficult to gather villagers at a common place to conduct Focused Group Discussion (FGD) and fill questionnaires.

In Govindpura, two other studies on climatic change and nutrition were also being conducted by GRAVIS during this period, which was both an advantage and disadvantage. Because of the other studies, it was possible to share certain information and to pool the villagers or interact with them and conduct meetings. However it being season, villagers were not able to spend more time with so many studies because they were engaged in farming. The questionnaire was long and three studies together might have affected the response from the villagers during group discussions and questionnaire, which is then triangulated with other tools and secondary data for verification.

Cultural constraints and deeply penetrated caste system in the villagers made it difficult for the study team to stay in the village.

Gender restrictions, lack of education, physical distance between the houses and lack of exposure...
made it difficult to interact with women, gather them for group discussions in both villages.

Local dialect (Marwari) which is spoken in the villages was difficult to understand and became a hurdle for communication. To overcome this, youth from the village who could speak both Hindi and Marwari were hired for translation while interacting with the villagers.
3. Crops and Gender Roles at Global and National Level

3.1. Crops in rainfed regions in the world

In the world, out of total 13 billion hectares of land, 1.69 (13%) billion hectares of land is under cultivation. Rainfed land is above 80% in total crop land area. 40% of the world population is living in dryland regions. Nearly 60% of the food production comes from the rainfed areas in the world\(^1\). Because of irrigation water scarcity, rainfed areas have become a possible alternative for food production. So, there is a critical need to focus on promoting food crops in rainfed areas. 1.5 billion people depend on rainfed agriculture.

69% of food crops including 86% of coarse grains, 84% of maize, 66% of wheat and 40% of rice come from the rainfed regions in the world. Average Worldwide rainfed cereal yield is 20 to 23 Q per hectare and in irrigated area; it is 35 Q per hectare\(^2\).

There are various crops such as cereals, leafy vegetables, root crops, vegetables and fruits grown in arid regions where there is erratic rainfall and high temperature.

Cereal such as millets, Wheat, Sorghum and Maize are the main crops in arid regions. Millets are an important and nutritious food crop for human beings and provides fodder to the livestock. 97% millet production is in the arid regions of developing countries of Asia and African continents. Particularly, more millets are produced in India, Nigeria and Niger. In Africa Sorghum and millets are grown in low rainfall conditions and without irrigation facilities.

Improving agriculture in arid regions is most important for food security. Lack of sufficient irrigation water, soil conservation, crop varieties, technologies and infrastructure facilities are main problems in arid regions.

Livestock like cattle, goats, sheep, donkeys and camels are important in these arid regions. Selling the livestock meat, milk, wool and skin is one of the important income sources to the people in the arid regions.

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1 Climate change, water and food security(Page No:47); FAO Water Reports: 36
2 EPTD discussion paper NO. 90; The Role of Rainfed Agriculture in the Future of Global Food Production; International Food Policy Research Institute; USA Page No: 73 and 74

<table>
<thead>
<tr>
<th>Characteristic Type - crop</th>
<th>Table 3: Crops depending on climatic conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High temperature tolerance</td>
<td>Cotton (Gossypium Herbaceum), Ground Nut (Arachis Hypogaea), Chilies,</td>
</tr>
</tbody>
</table>
Drought resistance - Common Millet, Barley, Chickpeas, Safflower (lower temperatures), Sorghum, Pearl Millet, Ground Nut (Arachis Hypogeal), Pigeon Pea, Sunflower crops, Radiatus (Gram mung bean), Cassava, Castor, Sesame

Lower temperatures favor - Wheat, Potato, Sugarcane, Tomato, Safflower

3.2. Crops in rainfed regions in India:
The Indian sub-continent is characterized by tropical monsoon with a lot of weather variations depending on distribution of rainfall and quantity. There are two monsoon systems such as South-west (or summer monsoon) system which account for 80% of rainfall and North-east rainfall system (or winter monsoon) which accounts 20% rainfall in the country. Almost every year some regions suffer from drought and at the same time, some other regions get flooded during monsoon between June and September. India has experienced 25 large scale droughts between 1891 and 2012. Delayed monsoons, early monsoons, monsoons withdrawal situations have become common in the country.

Millions of marginal and small farmers live in a harsh environment conditions such as limited rainfall and high temperature. Arid and semi-arid land occupies above 50% of the geographical area with 69% of rural population in the country. In India, dry land cultivation is 66% of the total crop area and produces half of the agriculture produce. These regions have low rainfall with average 100 mm to 850 mm per year. These regions characterize tough conditions such as low rainfall, less soil fertility and high temperature. The crops here grow in long dry seasons, inadequate and untimely rainfall and less fertile soil conditions.

Sorghum and Pearl Millets are important crops in arid and semi-arid regions. Pearl Millet is cultivated in 9.3 million hectares and Sorghum in 8.3 million hectares. These crops provide employment, income and food security to small and marginal scale farmers and provide fodder to the livestock. Sorghum is cultivated in central and western Maharashtra, northern Karnataka, Andhra Pradesh and Tamil Nadu whereas Pearl Millet is cultivated in Rajasthan, Gujarat, Maharashtra, Uttar Pradesh and Haryana. While Sorghum is cultivated in both the agricultural seasons like rainy season (Kharif) and post rainy season (Rabi), Pearl Millet is cultivated mostly in rainy season.

Sorghum and Pearl Millets are best suited crops for rainfed agriculture for four reasons.

- These crops need less external inputs, low labor, are of short duration and resistant to pests and diseases
- Farmers can be cultivated in extreme dry conditions and well suited to drought-prone regions
- These crops have highly nutritional values especially iron, zinc and calcium
These crops are very important resource to provide fodder to livestock. These crops can be termed as poor person’s food crops.

Current scenario

The millet crops production has been declining for decades in the country. After 1980 the Pearl Millet cultivation declined in different reasons. The green revolution which focused more on high yield-high fertilizers and pesticides, particularly focused on rice and wheat crops in irrigated areas to achieve food security in the country. On demand side also, government has been providing rice and wheat to the people at low cost through Public Distribution System (PDS). People’s consumption habits changed and they prefer more rice and wheat instead of Sorghum and Pearl Millets. These factors led to the decline of Sorghum and Pearl Millet production.

Sorghum and Pearl Millet crops are basically food crops and farmers produced these crops for self-consumption and not for the market. So these crops are crucial in food security to the poor people in arid and semi-arid regions in the country.

3.3. Gender in agriculture (Meta-analysis)

In agriculture, typically women all over the world are involved in labor intensive work but not in the kind of work that involves decision making.

On an average, 43% of women labor is involved in agriculture in the world. It varies by country, region, crop, social group, production cycle and ethnic group. Women farmers produce more than half of the food in the world and particularly 80% in Africa and 60% in Asia. Only 5% of the women access agriculture extension resources and 2% have land title (Patta) in the world. Women comprise 50% of agriculture labor force in Eastern Asia & Sub-Sahara Africa and 20% in Latin America. In developing countries on an average in a week, women work 13 to 14 hours more as compared to men.

The traditional socio-cultural values decide the dress code, division of labor, education opportunities etc. These also impose restrictions on women’s mobility.

Women role is limited to drudgery inducing activities in agriculture. They are involved in production and harvesting stages with specific roles like seeding, transplanting, weeding, threshing, winnowing and cleaning whereas men involve in crop selection, purchasing inputs, ploughing, watering, harvesting, transporting, marketing the produce etc. Their role in economic activities and decision making like selection of crop, inputs purchase marketing is limited. They get less payment compared to men despite of the hard work.
<table>
<thead>
<tr>
<th>Livelihood</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Ploughing, leveling the land, seeding using machines, applying the fertilizers, spraying the pesticides, maintain the irrigation facilities (water supply, Maintain the electrical motor pump) bag filling.</td>
<td>Planting, transplanting, seeding, weeding, winnowing.</td>
</tr>
<tr>
<td>Livestock</td>
<td>Ploughing with the animals (oxen), grazing the livestock, vaccination, collection of milk and marketing to the dairy center.</td>
<td>To maintain the livestock, grazing the animals and washing the animals and clean the cattle shed.</td>
</tr>
<tr>
<td>Labor</td>
<td>Cutting the trees, ploughing the land, seeding, applying the fertilizers, spraying the pesticides, to maintain the irrigation facilities (water supply), construction of houses, driving the vehicle, MGNREGS work, protecting the crop from birds and animals.</td>
<td>Seeding, weeding, harvesting, and segregating the product from the dust.</td>
</tr>
</tbody>
</table>
4. Study Findings and Analysis

4.1. Background of the study area

Rajasthan

Rajasthan is the largest state in India with an area of 3,42,239 sq. km occupying 10.4% of the country's total geographical area. The state is surrounded by Pakistan to the West, Gujarat and Madhya Pradesh to the South, Uttar Pradesh to the Northeast, and Punjab to the North.

Agriculture being 28% of the overall economic contribution in terms of value remains its backbone. The services industry has grown to 43% and industry has grown to 29% of the state's GDP. The population of Rajasthan is 68,548,437. Nearly 90% of Rajasthan's population is Hindu with Muslims making up the largest minority with 8% of the population. Schedule Castes (SC) and Schedule Tribes (ST) form about 70% and 12% of the state’s population respectively. The population of the tribes in Rajasthan is nearly double of the national average, with original inhabitants Bhil and Meena forming the largest group.

There are various local dialects and regional variations in Rajasthan and Marwari is the predominant language of Rajasthan.

Two third of the population of the state is dependent on agriculture and allied activities for its livelihood. Agriculture in Rajasthan is rainfed. Major crops grown in the state are Pearl Millet (Bajra), Moth Bean, Cluster Bean, soybean, Wheat, Green Gram, Rape seed and Mustard. Major cash crops in the state are Cluster Bean, Rapeseed/Mustard, Cumin, Cotton, Coriander, etc. Rajasthan has the distinction of being the highest producer of spices and condiments in the country. The occupational pattern among households in general and the poor in particular, shows their dependence on varied sources of livelihood, majorly on agriculture followed by other different kinds of labor work. In Rajasthan, animal husbandry is not merely a subsidiary to agriculture but it is a major economic activity especially in arid and semi-arid areas, thus providing the much needed insurance against prominently occurring scarcity conditions. Rajasthan possesses 12.46% of the total animal population of the country and contributes to almost 10% of the milk production, 1.07% of the meat production and 39% of wool production. The sector accounts for about 13% of the state’s domestic product. The state is the highest producer of wool and ranks third in milk production in the country.

Water:

Water in the Thar Desert area is both, scarce and sacred. The region suffers from severe water scarcity due to less rainfall (300mm per annum) and less water retention capacity of the soil.

People in these regions are depending on indigenous rainwater harvesting techniques such as tanks (a sealed underground tank constructed for rainwater collection - locally called as Tanka), ponds, Beri (a pitcher shaped percolation shallow tank) etc. to meet their drinking water requirements. In the places where these traditional methods and sources are working, this saves a lot of time and reduces drudgery for the women and children to fetch drinking water from kilometers away and also save money from buying water through tankers.
4.2. Govindpura

Govindpura is situated in Osian Tehsil (Bawari block) of Jodhpur district in western Rajasthan; the village is located between 26° 44' 50.89 N latitude and 73° 4' 54.38 E longitude. It is located at 85 km from district headquarter and 19 km from Bawari block head quarter. Govindpura village comes under the Danwara Gram Panchayat. Nearby villages of Govindpura are Danwara, Barakala, Begdiya, and Mansagar. The old name of the village is Gool-Dhaniya which was converted to Govindpura. Before 2002, Govindpura and Danwara were considered as one revenue village but in 2002 Govindpura became a separate revenue village which comes under Danwara Gram Panchayat.

The temperature varies from 49 °C in summer to one degree in winter, the average temperature ranges between 25 – 40 °C. The average annual rainfall in the village is about 280 mm,

Rainfall & Climate

Extreme heat in summer and severe cold in winter is the characteristic of the desert climate. Jodhpur is no exception. The rainy days are limited to maximum 15 days in a year.

The average rainfall is 302 mm. Almost 80% of the total annual rainfall is received during the southwest monsoon, which onsets in the first week of July and withdraws in the mid of September. Drought analysis based on agriculture criteria indicates that the district is prone to mild and normal type of droughts. Occurrence of severe and very severe type of drought is very rare.

Soil in Jodhpur district is classified mainly as sandy and loamy. The district comes under arid zone of the State and on account of non-availability of adequate water, cropping pattern is, by and large, single only. Only 2.91% of the net cultivated area is being utilized for double / multiple cropping. During kharif, Pearl Millet (Bajra), Sorghum (Jawar), Mung (Vigna Radiata), Moth, Cluster Bean (Guar) and Til (Sesame) are the main crops and during Rabi, Wheat, Barley and Mustard are the main crops in the district. In a limited area (about 12 percent) ground water is the only source of irrigation during Rabi season.

Osian

Osian is one of the seven tehsils that comes under Jodhpur district and is 60 km from Jodhpur. It has the maximum cultivated area. The soil texture is Sandy to loamy and the average rainfall is 226 cm. The major crops in the area are Pearl Millet (Bajra) Wheat, Mustard, Ground nut, Cluster Bean, and Cumin (Jeera). Average land holding in the area is 3.59 ha. 45 % of the area is single cropped and 10.09 % is double cropped. The main source of irrigation is deep tube wells.
Danwara

Danwara is the gram panchayat of the study village Govindpura with four other revenue villages namely Danwara, Basni, Mansagar and Govindpura.

Caste system is very strong in the village. Present sample survey covers households from the Jat community with only one exception of a Bhil household. The entire village is vegetarian except the Bhil and the Rajput.

4.2.1. Social situation

Govindpura has total 207 households with a population of 1296 (census 2011), in which 720 are male and 576 are female with around 50% are eligible to vote. The Village is divided in 15 groups according to caste and sub caste each group consists of 8-10 families, the distance between each group ranges from one to three km.

There are three different caste categories namely, Other Backward Caste (OBC), Scheduled Tribe (ST) and General. The main castes are Jat, Rajput, Bhil, Devasi, Suthar etc. 95% of the village population belong to OBC category.

The houses in Govindpura are usually those with thatched roofs with some concrete (Pucca) houses. Electricity facilities are there but restricted only to certain households. The major festivals in the village are Holi, Diwali and Rakshabandhan.
### Table 5: Social map – Govindpura

<table>
<thead>
<tr>
<th>#</th>
<th>Particulars</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No. of Families</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gen</td>
<td>5 (Rajput)</td>
</tr>
<tr>
<td></td>
<td>OBC</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td>Minority</td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>6 (Bhil)</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>No.</td>
</tr>
<tr>
<td>2</td>
<td>No. of Households</td>
<td>207</td>
</tr>
<tr>
<td>3</td>
<td>Population</td>
<td>1296 (census 2011)</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>576</td>
</tr>
<tr>
<td></td>
<td>Single Women</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Single men</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Migration - approx no.</td>
<td>8 (Pune, Haryana, Jodhpur)</td>
</tr>
<tr>
<td></td>
<td>Physically Challenged Persons</td>
<td>2 (Handicap by legs-polio)</td>
</tr>
<tr>
<td></td>
<td>Child Labor</td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>Orphans</td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>Other information if any</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>POP / BPL Data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POP</td>
<td>6 (Bhil)</td>
</tr>
<tr>
<td></td>
<td>BPL</td>
<td>30 (Jats, Devasi)</td>
</tr>
<tr>
<td>5</td>
<td>Housing Particulars</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pucca Houses</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Huts</td>
<td>174</td>
</tr>
<tr>
<td>6</td>
<td>Livestock</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cows &amp; Buffaloes</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Bullocks</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Calves</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Sheep</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Goats</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Camel</td>
<td>4</td>
</tr>
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</table>
### 4.2.2. Resources

#### Land:

<table>
<thead>
<tr>
<th>Others (Infrastructure)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Panchayath Office</td>
<td>1</td>
</tr>
<tr>
<td>Primary health center</td>
<td>No. (PHC in Danwara 6km away from this village)</td>
</tr>
<tr>
<td>Hospitals</td>
<td>No. (PVT hospitals in Bawri Block 19km away from this village)</td>
</tr>
<tr>
<td>Veterinary Clinic</td>
<td>No.</td>
</tr>
<tr>
<td>School Building</td>
<td>2 (1 primary school, 1 upper primary school)</td>
</tr>
<tr>
<td>Temples</td>
<td>1</td>
</tr>
<tr>
<td>Community Halls</td>
<td>No.</td>
</tr>
<tr>
<td>Post Office / Accessibility</td>
<td>No</td>
</tr>
<tr>
<td>Library</td>
<td>No</td>
</tr>
<tr>
<td>Bus Facility</td>
<td>Yes (Private travels)</td>
</tr>
<tr>
<td>Bus shelter</td>
<td>No</td>
</tr>
<tr>
<td>Telephone Facility (Y/N)</td>
<td>Yes (mobile)</td>
</tr>
<tr>
<td>Cement Roads</td>
<td>No</td>
</tr>
<tr>
<td>Water Tank</td>
<td>15 (Government)</td>
</tr>
<tr>
<td>Public Taps</td>
<td>No</td>
</tr>
<tr>
<td>Private Taps</td>
<td>No</td>
</tr>
<tr>
<td>Wells</td>
<td>No</td>
</tr>
<tr>
<td>Hand Pumps</td>
<td>No</td>
</tr>
<tr>
<td>Wine shop</td>
<td>No</td>
</tr>
<tr>
<td>Cable connection</td>
<td>No</td>
</tr>
<tr>
<td>Dish connection</td>
<td>30</td>
</tr>
<tr>
<td>PDS</td>
<td>No. (nearby village) Bagdiya Village 3km away from this village</td>
</tr>
<tr>
<td>White Card holders</td>
<td>30</td>
</tr>
<tr>
<td>Pink Card Holders</td>
<td>177</td>
</tr>
<tr>
<td>Public Toilets</td>
<td>No</td>
</tr>
<tr>
<td>Private Toilets</td>
<td>10</td>
</tr>
<tr>
<td>Pensioners</td>
<td>46</td>
</tr>
<tr>
<td>Old age</td>
<td>30</td>
</tr>
<tr>
<td>Widows</td>
<td>15</td>
</tr>
<tr>
<td>Army</td>
<td>1</td>
</tr>
<tr>
<td>8 Institutional Aspects</td>
<td></td>
</tr>
<tr>
<td>Cooperatives</td>
<td>No</td>
</tr>
<tr>
<td>SHGs</td>
<td>5</td>
</tr>
<tr>
<td>Youth Clubs</td>
<td>No</td>
</tr>
<tr>
<td>Kisan Mitra</td>
<td>Kisan Club (1) (11 members and all are men)</td>
</tr>
<tr>
<td>Working NGOs</td>
<td>Gramin Vikas Vigyan Samiti (GRAVIS)</td>
</tr>
<tr>
<td>Others if any</td>
<td>ICRISAT</td>
</tr>
</tbody>
</table>
Based on the information from the resource map and secondary source from the patwari, the total geographical area of the village is 1400 ha., out of which 950 ha comes under rainfed cultivation and around 100 ha comes under irrigated farming. The ground water level of the village is very low, so it is required to dig a bore well around a depth of 500 to 600 feet which is both financially and ecologically, expensive. The irrigation facilities are not good with only 14 farmers having tube well facilities for irrigation. The village has one river which flows for only two months in July and August, for an hour depending on the rain intensity. For drinking water needs, the Gram Panchayat has constructed 15 water tanks, which are filled by four Government tube wells (bore wells).

The land holding size of farmers ranges from five acres to 20 acres. Soil of the village is classified mainly as sandy and loamy, which is suitable only for drought tolerant crops and high root penetration crops like Pearl Millet (Bajra)), Cluster Bean etc.

Water:

Water being scarce, for drinking as well as irrigation, people depend on traditional rain water harvesting structures called ‘Tanka-an underground tank’ for drinking and bore wells for agriculture.

There are 15 water tanks, constructed by the government. These tanks are connected with each other and filled with water using four bore wells to supply drinking water for the households.

A local NGO called GRAVIS is also working in the village since 2008 on several issues like drinking water, organizing health camps, plantation and gender empowerment. It has constructed rain water harvesting ‘tanks’ for individual households, based on their economic conditions. The size of the tank constructed in such a way that it can provide water for a family of 5-6 members for 6-8 months. It has saved a lot of time and reduced drudgery for the women and children who otherwise have to fetch drinking water from kilometers away. Villagers are of the opinion that such tanks are very helpful for them and more tanks need to be constructed to cover the entire village.
Value Chain Analysis – Report

4.2.3 Livelihoods

According to the Livelihood mapping, TITO and sample study (refer table 8 below), agriculture is identified as the main source of livelihood in the village. Farmers grow Pearl Millet (Bajra), Cluster Bean (gaur), Green Gram (Mung), Sesame (Til), Cotton (Kapas) etc. in rainy (Kharif) season. Mustard (Sarson), Cumin (Jeera), and Wheat (Gehun) are grown in winter (Rabi) season. The production of crop varies according to the soil and climatic condition.

Pearl Millet (Bajra) was identified as the major food crop and Cluster Bean (Gaur) as the major cash crop in the village (refer figure 2 for crop wise land distribution in the sample).

The second source of livelihood is livestock. Villagers keep goats, sheep, cows and buffaloes, bullock etc. Goats are reared for milk production whereas sheep are kept for meat and wool. Because of the water scarcity, cows and buffaloes are kept in less quantity. Villagers opined that the livestock population is reducing continuously because of lack of pasture land and water (refer figure 5 and 6 above for order of primary and secondary livelihoods in the village). Among the Bhil community, the major livelihood is labor work because they do not have agricultural land. There are about eight government employees in the village serving in different fields like schools, railways, Rajasthan administrative services, etc. There is one grocery (Kirana) shop in the village set up by a retired army pensioner.
Traded - in Govindpura

Figure 7: Traded - in Govindpura

Traded – out Govindpura
Traded-in and Traded-out

According to traded-in and traded-out, at village level people are able to spend an average 26% of their income in agriculture. 44% income spends on consumption. Particularly 14% of income spends on opium and alcohol. Nearly 60% of income comes from agriculture and 10% of income comes from livestock rearing.

4.2.4. Typology of livelihoods

Agriculture-

Pearl Millet (Bajra) is the main food crop in the region; farmers grow Pearl Millet mainly for consumption and not for marketing. Each farmer grows Pearl Millet in around one to two acres of land but it varies according to size of the land holding and the family size. They store the produce until they get the produce of the next year crop. Based on the climatic condition, particularly the rain forecast, and sown crop condition, farmer decides to sell the remaining quantity. The main source of irrigation for winter crop is tube wells. Electricity facilities are there for tube wells but restricted only to certain farmers. The farmers use sprinkler system for irrigation to save water. Due to lack of proper irrigation facilities, farmers mainly grow the monsoon season crop and not the winter season crop. In the village, about 15 years back, farmers used to do mixed cropping like Cotton with Green Gram or Pearl Millet with Green Gram so that they can get at least one product in case of crop failure. But now this practice is not followed. According to the community, the maturity times of these crops vary, and harvesting one crop, while the other is still standing on the field becomes difficult for them, leading to damage of standing crop. Also, if there is a pest attack, both crops suffer, and some are more susceptible to pest attacks.

Farmers use improved seeds only for cash crops like Castor, Cluster Bean, Cotton and Mustard, which they sell in the market. For consumption, they grow Pearl Millet (Bajra), Green Gram (Mung) and Moth Bean (Moth).

When improved seeds are used for food crops, the production of grain is more but the fodder production becomes less as compared to own seed. Also the taste is different and it takes longer to cook.

Farmers leave the land fallow for 1-2 years after cultivation of Moth, to regain its fertility.

Some farmers in the village take land on lease with the ratio of 1:2, of which two thirds of the harvested crop is given to the land owner and remaining is for the tiller. All the labor work is done by the tiller and input is provided by land owner.

Sowing season
<table>
<thead>
<tr>
<th>Crop</th>
<th>Sowing Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl Millet (Rainfed)</td>
<td>First week of July to last week of July</td>
</tr>
<tr>
<td>Pearl Millet (Irrigated)</td>
<td>Second week of June to last week of June</td>
</tr>
<tr>
<td>Cluster Bean</td>
<td>First week of July to first week of August</td>
</tr>
<tr>
<td>Mustard</td>
<td>Last week of September to second week of October</td>
</tr>
</tbody>
</table>
Table 8: Crop details in Govindpura

<table>
<thead>
<tr>
<th>Crops</th>
<th>Seed requirement Kg/Ha</th>
<th>Production Q/Ha</th>
<th>Market price in Rs/Q</th>
<th>MSP in Rs/Q (2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl Millet</td>
<td>8.5 - 10</td>
<td>6.25 - 12.5</td>
<td>1300-1500</td>
<td>1175</td>
</tr>
<tr>
<td>Cluster Bean</td>
<td>15-16.25</td>
<td>3.75 - 4.5</td>
<td>5000</td>
<td></td>
</tr>
<tr>
<td>Green Gram</td>
<td>11.25-15</td>
<td>6.25 - 7.5</td>
<td>5000</td>
<td>4400</td>
</tr>
<tr>
<td>Castor</td>
<td>11.25 - 15</td>
<td>5 - 6.25</td>
<td>3000-3500</td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>162.5 – 175</td>
<td>35 – 40</td>
<td>1600-1800</td>
<td>1350</td>
</tr>
<tr>
<td>Mustard</td>
<td>6.25 - 7.5</td>
<td>7.5 – 10</td>
<td>3000-3500</td>
<td>3000</td>
</tr>
<tr>
<td>Cumin</td>
<td>8.75 - 9.5</td>
<td>6.25 - 7.5</td>
<td>10000-12000</td>
<td></td>
</tr>
<tr>
<td>Sesame</td>
<td>3 – 5</td>
<td>6.25 - 7.5</td>
<td>5000-8000</td>
<td>4200</td>
</tr>
</tbody>
</table>

Farmer classification according to land holding:

Figure 9: Respondents farmers in Govindpura

Figure 10: Farmers in Govindpura
**Wages**

<table>
<thead>
<tr>
<th>Work</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Rs.200 to 300/day</td>
<td>Rs.350 to 450/day</td>
</tr>
<tr>
<td>Non Agriculture</td>
<td>Rs.200/day</td>
<td>Rs.300 to 350/day</td>
</tr>
</tbody>
</table>

- At the time of harvesting of crop men and women get Rs.500 to 600/day
- Non agriculture work – Construction, Boundary preparation for field, Tractor driving etc.

**Livestock**

Villagers rear goats, sheep, cows and buffalos in the village for different purposes. Goats are the largest in number followed by sheep (refer table social map - Govindpura). From the livestock they get income by selling milk from goat, sheep, cows and buffaloes, selling goat and sheep kids in the Baori market for meat.

In the past (15-20 years back), villagers practiced common grazing system, in which one person take care of all the livestock in the village. For this, the person collected money from every family depending on the number of livestock owned by the family. However, due to lack of pasture land, this system does no longer exist. Now each family takes care of their animals on their own.

Livestock rearing which is a complementary livelihood in the desert landscape and it is reducing because of water and pasture-land scarcity.

In the summer season the main problem for livestock rearing is fodder and water scarcity. Reduction in livestock has impacted the whole life cycle of a family, e.g. since livestock is limited, the families cannot get enough manure for agriculture so they use more fertilizers, which increases the production cost. Secondly they cannot get milk and butter (ghee) for consumption, so they have to buy from other villagers, which also increase the family expenditure. Some farmers sell the milk in Baori. The price of one liter of milk in Baori is Rs.20 -25. In the village around eight families depend on livestock rearing as primary livelihood.

Figure 11: Livestock details of respondents in Govindpura
Livestock details of Respondents

- Bullocks: 42%
- Cows: 33%
- Buffaloes: 18%
- Goats: 4%
- Sheep: 0%
- Other: 3%
4.3 Dhok

Dhok village is situated in Chountan block of Barmer district of western Rajasthan. It is located 58 km away from the district headquarters and five km from Chountan block. It is the panchayat village of Dhok gram panchayat.

Barmer

Barmer is the second largest district of Rajasthan located in western Rajasthan. This district is part of the Great Indian Desert or Thar Desert. Like all other districts in the desert region, Barmer is also known for its folk music and dance. It has a population of 2,603,751 with a sex ratio of 901 female to 1000 male as per 2011 census.

Rainfall and climate

Extreme heat in summer and severe cold in winter is the characteristic of this region, the temperature rises up to 45 – 50°C in summer and dropping in winter drops to 0°C. Average rainfall of the district is 207 mm. However there are occasional occurrences of floods due to heavy and continuous rain fall of more than 500 mm.

4.3.1. Social situation

Dhok has a total population of 3000. There are three different caste groups namely Other Backward Caste (OBC), Scheduled Tribe (ST), General (OC). The OBCs and the general caste (Suthar, Darji, Rajpurohit, Rajput) appear to be rich and enjoy social, political and economic power in the village. Most of the ST caste (Bhil and Manganiya) families are economically weak. Manganiya do not own any land and make a living by performing, singing in functions, within and outside the village, and also by collecting food grains from the villagers.

The sarpanch of the village is an elder woman from Rajpurohit caste. However all the village development works are looked after by her son.

Village structure

The village is divided in to two parts namely main village and ‘Dhani’ (typically located in the agricultural land).

Though there is a main village for Dhok, some villagers of Dhok are spread in a wide area in small groups – caste wise or families wise which are locally called ‘Dhani.’

Out of 500 families, while communities like Rajpurohit, Rajput and Darji live within the village and Maganiya community live separately in the main village. Bhil community lives in Bhildi, Ketanoki Dhani, carpenters live in Sutaronki Dhani (Two carpenter families live within the village).

Changes in the village structure

Prior to 20 years, all villagers lived in the same village except Bhil community, who used to take care of the agriculture fields of the farmers which were located far from their residences. Gradually people started moving closer to the fields; presumably to take better care of the fields, guard the crops from animals etc. Hence they started to live within their fields, in same caste groups. However, since their houses are located within their fields, the houses are usually at a distance of about 0.5 to two km from each other and so, the people have to travel one to two km in order to go to village for any purpose. As no vehicles, other than heavy four wheel vehicles can be driven in the sand, they usually walk all the distances. This is a major constraint to the mobility, especially for women who besides the household, agriculture, livestock activities, have to walk long distances for any other purpose. This made them more or less, confined within the village or Dhani.

A weather station has been installed in the village by ICRISAT. The village has a PHC, one secondary high school, two primary schools and one private school. For higher studies, students go to Choutan and Barmer. Refer table 11 Social map – Dhok for the village social profile.
The list of 47 sample households comprises of 14 from Bhil (ST) community, 13 each from Rajput and Rajpurohit, three families each from Suthar and Darji (tailor) community and one Manganiya family. Refer Annexure 2 for details of sample households.

**Source of income - village**

In the village, 40% of the population depends on agriculture, followed by wage labor at 45%. There are about 5% that depend on livestock, 3% drivers, 2% carpenters and 5% government and private employment.
### Table 9: Social map – Dhok

<table>
<thead>
<tr>
<th>#</th>
<th>Particulars</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of families</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>OC</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>OBC</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Minority</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>270</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>199</td>
</tr>
<tr>
<td>2</td>
<td>Number of households</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>Population</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>1272</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>772</td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td>956</td>
</tr>
<tr>
<td></td>
<td>0 to 5</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>6 to 10</td>
<td>224</td>
</tr>
<tr>
<td></td>
<td>11 to 15</td>
<td>667</td>
</tr>
<tr>
<td></td>
<td>Literacy details</td>
<td>54%</td>
</tr>
<tr>
<td></td>
<td>Vulnerable people</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Single women</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td>Migration - approx no.</td>
<td>30 (only male members)</td>
</tr>
<tr>
<td></td>
<td>Physically challenged persons</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Child labor</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Orphans</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Other information if any</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BPL data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POP</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Others*</td>
<td>390</td>
</tr>
<tr>
<td>5</td>
<td>Housing particulars</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Pucca houses</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td>Kuccha houses</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>Huts</td>
<td>246</td>
</tr>
<tr>
<td>6</td>
<td>Livestock</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cows &amp; buffaloes</td>
<td>1760 &amp; 12</td>
</tr>
<tr>
<td></td>
<td>Bullocks</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Calves</td>
<td>560</td>
</tr>
<tr>
<td></td>
<td>Sheep</td>
<td>2275</td>
</tr>
<tr>
<td></td>
<td>Goats</td>
<td>5650</td>
</tr>
<tr>
<td></td>
<td>Camel &amp; horse</td>
<td>110 &amp; 06</td>
</tr>
<tr>
<td>7</td>
<td>Others (Infrastructure)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Panchayat</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td>Primary Heath Center</td>
<td>01</td>
</tr>
<tr>
<td><strong>Hospitals</strong></td>
<td>No (go to Chountan)</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Veterinary clinic</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>School building</strong></td>
<td>04 govt. (3 primary school, 1 sec. School), 01 private school (upper primary)</td>
<td></td>
</tr>
<tr>
<td><strong>Temples</strong></td>
<td>05 (03 Viratra temple, 01 Bandmata temple, 01 Chamundamata temple)</td>
<td></td>
</tr>
<tr>
<td><strong>Community Halls</strong></td>
<td>02 Meeting hall for villager</td>
<td></td>
</tr>
<tr>
<td><strong>Post Office / Accessibility</strong></td>
<td>01 (02 staff)</td>
<td></td>
</tr>
<tr>
<td><strong>Library</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Bus Facility</strong></td>
<td>Yes (Govt.)</td>
<td></td>
</tr>
<tr>
<td><strong>Bus shelter</strong></td>
<td>01/shed</td>
<td></td>
</tr>
<tr>
<td><strong>Telephone Facility (Y/N)</strong></td>
<td>Mobiles</td>
<td></td>
</tr>
<tr>
<td><strong>STDs</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Cement Roads</strong></td>
<td>01 large (1 km) 04 small size</td>
<td></td>
</tr>
<tr>
<td><strong>Water Tank</strong></td>
<td>05</td>
<td></td>
</tr>
<tr>
<td><strong>Public Taps</strong></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Private Taps</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Government Bore Wells</strong></td>
<td>05</td>
<td></td>
</tr>
<tr>
<td><strong>Hand Pumps</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Wine shop</strong></td>
<td>01</td>
<td></td>
</tr>
<tr>
<td><strong>Cable connection</strong></td>
<td>Personal Dish TV</td>
<td></td>
</tr>
<tr>
<td><strong>Public Toilets</strong></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td><strong>Private Toilets</strong></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>Pensioners</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Old age</strong></td>
<td>300 (male &amp; female)</td>
<td></td>
</tr>
<tr>
<td><strong>Widow</strong></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>MGNREGS</strong></td>
<td>461 total workers (Only 45 workers do full 100 days work, 416 workers less than 100 days work)/503 job cards</td>
<td></td>
</tr>
</tbody>
</table>

**Institutional Aspects**

<table>
<thead>
<tr>
<th><strong>Cooperatives</strong></th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHGs</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>VO</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Youth Clubs</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Kisan Mithras</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Working organizations</strong></td>
<td>ICRISAT, GRAVIS</td>
</tr>
</tbody>
</table>

*Others – not so poor and not poor*
4.3.2. Resources

Dhok is a big village with total land of 4155 ha and total 1258 ha of land is cultivated. 1164 ha of land is rainfed land and 94 ha is irrigated land. Also, 2095 ha of land is government land /trust /temple land, 735 ha is barren land, 17 ha is hilly land and 50 ha is river land.

Table 10: Land details of sample families in Dhok

<table>
<thead>
<tr>
<th>Land detail</th>
<th>No of families</th>
<th>% out of 47 households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details of rainfed land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own land</td>
<td>46</td>
<td>97.9</td>
</tr>
<tr>
<td>Leased in land</td>
<td>10</td>
<td>21.3</td>
</tr>
<tr>
<td>Leased out Land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Un cultivated Land</td>
<td>5</td>
<td>10.6</td>
</tr>
<tr>
<td>Details of Irrigated land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own Land</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Leased land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Leased out Land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Un-cultivated Land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total cultivated wet land</td>
<td>1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Figure 13: Land details in Dhok

Dhok is a traditional rain water harvesting structure which is constructed underground to collect and store rain water. This tanka caters to the need of drinking water for the family.

The tanka is constructed in such a way that a cylindrical tank/ well is dug underground with varying dimensions from 6 to 10 feet of diameter and depth depending on the number of families and their requirement and is plastered with cement in order to prevent the water from percolation. The top of the tank is covered and sealed with cement to prevent the water from external contamination such as dust, evaporation etc. They also treat the walls and bottom with lime in order to prevent the growth of microorganisms that contaminate the water. A catchment area is developed around the tanka in such a way that rain that falls in this area is channelized to enter the tanka through the inlets provided. A small opening is provided at the top of the tank with a closure so that people can fetch water from the tank either using buckets or fixing a small hand pump.

Since the water collected is from rain, it remains pure and potable for a long period. The water once stored in the tanka caters the needs of the families for 6 – 8 months in otherwise extreme draught conditions depending on their usage. Villagers say that they are not required to clean the tanka for 3 – 4 years because the tanka is sealed so tightly from any contamination.

Families use the water in a very conservative manner and do not let any drop from it go as waste.

Figure 14: Tanka in Dhok

Water:

The village has three rivers - Yamuna, Badna, Koluja and one pond near the Viratra temple. There is one check dam near Bahmata temple which receives water only in rainy season. Though there are three rivers, they don’t have capacity for water retention and they dry up within an hour of rain due to the extremely sandy soil. The ground water level is very deep about 350- 400 feet in the village. This is the major reason for the farmers to depend on rain water for agriculture. There are 10-private bore wells and five government bore wells in the village.

Table 10: Land details of sample families in Dhok

<table>
<thead>
<tr>
<th>Land detail</th>
<th>No of families</th>
<th>% out of 47 households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details of rainfed land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own land</td>
<td>46</td>
<td>97.9</td>
</tr>
<tr>
<td>Leased in land</td>
<td>10</td>
<td>21.3</td>
</tr>
<tr>
<td>Leased out Land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Un cultivated Land</td>
<td>5</td>
<td>10.6</td>
</tr>
<tr>
<td>Details of Irrigated land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own Land</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Leased land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Leased out Land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Un-cultivated Land</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total cultivated wet land</td>
<td>1</td>
<td>2.1</td>
</tr>
</tbody>
</table>
About 270 private tankas- rain water harvesting structures were constructed in the village to collect rain water. These tankas are the only sources of water for the villagers throughout the year. Otherwise they have to buy water from tankers at a very high price, from 20 paise to 50 paise per liter.

Improved seeds of Moth Bean of short duration (45 days instead of 60 days) were distributed by ICRISAT to 30 families in the village. The Integrated Watershed Management Program (IWMP) is involved in making traditional rain water harvesting structures, called tankas (small underground covered wells) (see Figure 14). There is also a check dam in the village.

4.3.3. Livelihoods

According to the livelihoods mapping and TITO tools, it is observed that the villagers have five major livelihoods. This is derived by considering the number of families dependent on them and income generated from those livelihoods (Refer table annexure 2 for Dhok Livelihoods mapping).

<table>
<thead>
<tr>
<th>Livelihood name</th>
<th>No of households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>42</td>
</tr>
<tr>
<td>Agricultural &amp; wage labor</td>
<td>39</td>
</tr>
<tr>
<td>Livestock</td>
<td>14</td>
</tr>
<tr>
<td>Enterprise and others</td>
<td>22</td>
</tr>
<tr>
<td>Employee</td>
<td>2</td>
</tr>
</tbody>
</table>
Figure 17: Traded –in Dhok
Figure 18: Traded-out Dhok
Traded-in and Traded-out

According to traded-in and traded-out, at village level people are able to spend an average 10% of their income in agriculture. 46% income spends on consumption. Particularly 6% of income spends on opium and alcohol. Nearly 54% of income comes from agriculture, 17% of income comes from livestock rearing and 17% income comes from agriculture labour.

Women earn merely Rs. 80 – 100 per day as wage under MGNREGS. They work from 9 AM to 5 PM in road construction, planting trees etc under this scheme.

4.3.4 Typology of livelihoods

Agriculture

In the village most of the farmers cultivate their own land. In the Kharif season, mixed cropping is adapted in order to make use of the rainfall. Seeds of Pearl Millet (65%), Green Gram (20%) and Moth Bean (15%) are mixed and sown. They also cultivate Cluster Bean as a single crop. Cluster Bean requires thick and loamy soil to grow well, which is not available in Dhok. So it’s grown only in few places. In Rabi season, only the farmers having irrigation facilities cultivate Cumin, Green Gram and Mustard. (Details of agricultural practice in the village are discussed in the Value Chain Analysis section of the document).

Labor

Bhil, being the largest community with 204 families who are marginal and small scale farmers depends on labor for sustenance. Mostly, it’s the men in the village who go for labor work and women stay in the home looking after agriculture, livestock and household activities during the rainy season. During summer, they look for work under MGNREGS within the village.

The men go for stone crushing work in the nearby hilly area of the village. They work for 8 – 10 hours a day and earn Rs. 200 – 300 depending on the work.

In Dhok, only women from Bhil community work under MGNREGS, whereas the other women stay at home because of caste and cultural restrictions.

Migration

Rainfed agriculture is being non-remunerative in Dhok, men in the village are migrating to other places to work as carpenters, masons, drivers, manganiyas- folk musicians etc. This migration is temporary and they return to the village during rainy season and engage in agricultural work. Only men from big families migrate from the village, thereby ensuring the presence of male members in the family to take care of outside activities.
Table 12: Migration details in Dhok

<table>
<thead>
<tr>
<th>Work at Migration</th>
<th>Place</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brick making</td>
<td>Bangalore</td>
<td>Barmer</td>
</tr>
<tr>
<td>Carpenter</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Driving</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Labor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Cook</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mechanic</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Tailoring</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Tractor</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Employment

With increasing literacy and agriculture being insecure, youth of the village are taking up public as well as private employment.

Private employment includes working as accountants, computer operators, laborers in wool industry, sales men, drivers etc, depending on their education. Most of them are working in Chountan and some others in Barmer district headquarters.

Dhok being in the border of Pakistan, 18 members from this village are working in Indian army.

Livestock

All families except the Manganiya community keep livestock in their households which includes goats, sheep and cows depending on the family’s economic situation.

Small ruminants like sheep and goat which are known for their drought tolerance are present in every household except Rajpurohit community. Rajpurohits being Brahmins, they only keep cows due to cultural constraints. Livestock is largely seen as useful in emergencies but not as a regular income source, due to following reasons

- Every household has goat or sheep or cow. Hence they don’t require to purchase or sell milk in the village
- In the villager’s opinion, goat milk has no market even in the block Chountan
- Though the villagers consume meat occasionally, they keep the animal to meet emergencies and to sell during drought or distress situations. There is no regular market for meat in and around the village
- Number of animals kept in a household is very less (2-4) due to unavailability of sufficient fodder and water
- Inability to provide fodder and water for cows, because of unavailability of water and fodder during summer, this becomes a burden for the villagers
<table>
<thead>
<tr>
<th>Particular</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural tools purchase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>Less</td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MGNREGS</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td>Less</td>
</tr>
<tr>
<td>Migration</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>Less</td>
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<tr>
<td>Diseases (People)</td>
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<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit(Agriculture)</td>
<td></td>
<td>Less</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Festivals</td>
<td></td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor (Agriculture)</td>
<td>Less</td>
<td></td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing(grain)</td>
<td>Less</td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainfall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Less</td>
</tr>
<tr>
<td>Fodder / goat</td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fodder Availability</td>
<td>More</td>
<td>Mor e</td>
<td></td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>More</td>
<td>More</td>
<td>More</td>
<td></td>
</tr>
<tr>
<td>Income(Agriculture income)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 Gender relations

In the study, determination of decision making power was focused on the degree of consultation with women. In Dhok women are not accessing loans. In Govindpura 97% women did not have ownership on houses and lands. One third of the women have no participation in decision making in purchasing of any assets or agricultural inputs in Dhok. They are not involved in purchase of land, house, plot, seeds, fertilizers, pesticides, livestock and selling agriculture produce, health, and education, marriage of their children, meeting family needs, travel and voting, education of children. Though it is visible that women have participation in decision making on agricultural produce, they are not involved in direct monetary transactions.

Women’s ownership of assets like land, houses and plots is very less particularly in the villages. This shows the dependence and vulnerability of women. Women should be empowered economically and socially to play a crucial role in development in the world particularly in developing countries. They can play an important role in agriculture development. But the existing inequalities and discriminations are not allowing women to exercise their full potentialities.

Refer Annexure C for women situation including the role of women in decision making in both villages. Whether a woman takes final decision or jointly with men is captured from household level questionnaire and presented in these tables.

5 Value Chain Analysis and Gender Role
5.1 Pearl Millet-Food crop (Govindpura and Dhok)

Pearl Millet is the staple diet of small householders in dry and arid areas. Dhok and Govindpura being arid areas, in both villages’ people cultivate Pearl Millet as food crop mainly for consumption. The advantage of growing this crop is that it is the hardiest and least risky cereal crop that provides food security for the people living in the areas. Besides grain, Pearl Millet is a good source of feed for livestock especially in the dry months when other feed resources are in short supply.

A comparative study of the value chain of Pearl Millet cultivation in Dhok and Govindpura is given. Value chain has described commonly for both villages wherever difference existing pointed below with special focus on gender role in every stage.

Value Chain Analysis of Pearl Millet

Inputs Stage:

**Land:** Land in both villages is owned by the men in the village. No land is registered in the name of women.

<table>
<thead>
<tr>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Of the total land under cultivation 80 acres have irrigation facility where farmers are growing two crops. No land is under tenancy for cultivation in the village as the available land itself is not sufficient for the farmers to grow food grains. Remaining land is rainfed.</td>
<td>Of the total land under cultivation 100 acres have irrigation facility where farmers are growing two crops in a year. No land is under tenancy for cultivation in the village. Remaining land is rainfed.</td>
</tr>
</tbody>
</table>

**Decision making**

The crops being cultivated are mainly for consumption but not for sale. Hence there is no choice of crops to be cultivated as all the villagers are cultivating Pearl Millet which is their staple food. The possibility that at least one crop will survive. In Dhok, Pearl Millet is the major crop which is sown Though it was not possible to trace the reasons, perhaps because the climatic conditions are increasingly unpredictable; they are practicing mixed cropping and mix two to three different crops, which have along with Green Gram and Moth Bean. This is being followed for a long time and is practiced like a routine, without any significant role being played by the men or women or in making any changes.

The food crops being cultivated are mainly for consumption and not for sale. Hence there is no choice of crops to be cultivated as all the villagers are cultivating Pearl Millet (Bajra), their staple food.

In the past, farmers used to take mix cropping like Pearl Millet (Bajra) + Mung (Vigna radiata), but now this practice is not followed because in inter cropping the maturity duration of both crops are different and harvesting of crops becomes difficult. In the village some farmers take land on lease with the ratio of 33:66, in which 66 % is for land owner and remaining is for the tiller.

**Seeds**
In Dhok, the farmers save Pearl Millet seeds and use it in the next season. They are not buying any of the seeds because they are producing the crop for food and not for sale. Hence trying to reduce the input costs as much as possible. Women clean and dry the seeds before seeding.

For sowing of Pearl Millet (Bajra), the farmers purchase improved seeds once in every three years. The yield from improved seeds is more compared to local seeds but their productivity reduces if used as seeds for the next season. Still, the farmers use it for three years by saving from the yield, and then buy fresh improved seeds at every three year intervals. The improved seeds being purchased are Tower MRB 2210, Calibre 204 etc.

Seed mix for rainfed land per hectare
Pearl Millet- 12.5 to 20 kg
Mung (Vigna Radiata)- 3 kg and Moth/Moth Bean (Vigna Aconitifolia) - 3 kg

Only Pearl Millet (Bajra)) is sown, 10 kg seed is sown per hectare

Fertilizer: Mostly animal manure – no specific addition of chemical fertilizer due to lack of water and uncertainty in the crop.

No pesticides are used.

Hariyali sulphur Rs.150 / 5 kg– Rs.500 purchased from Baori or Osian (Note: Mostly irrigated land famers use Vanish pesticide to kill insects in germination period. It costs @ Rs. 350 per liter.)

Implements: Tractor, Tools for cleaning – sickle, polythene bags

Mostly farmers’ and including their family members work in the crop farming. They utilize paid laborers at the time of weeding and harvesting.

<table>
<thead>
<tr>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed mixing in Dhok</td>
<td>Seed mixing before sowing: Women prepare the seed mix by cleaning and separating the already stored seeds from husk and infertile seeds. Before seed mixing, women dry saved seeds in sunlight for one day. Elder women protect seeds from birds while seeds are drying. These seeds are then mixed thoroughly with hands as per their requirement.</td>
</tr>
<tr>
<td>Grain mix for rainfed land per hectare</td>
<td>Pearl Millet- 12.5 to 15 kg/ha. Pearl Millet (Bajra) being their staple food and more drought resistant is taken in larger proportion – 60 to 70 % of the total seed.</td>
</tr>
<tr>
<td>Mung (Vigna Radiata)- 3 kg and Moth/ Moth Bean (Vigna Aconitifolia) - 3 kg</td>
<td>The second important food crop for the villagers, Mung (Vigna Radiata) 5 to 7.5 Kg is taken in a proportion from 30 – 20% of the total seed.</td>
</tr>
</tbody>
</table>

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Moth Bean (Vigna Aconitifolia) 2.5 to 5 kg being third in priority and optional (rare cases), is taken in relatively smaller quantity 10 – 20%.

The seed proportion is determined depending on the farmer’s requirement and the certainty of monsoon. If the farmer’s land is very small, they take major proportion of Pearl Millet as food crop.

For comparatively big farms, farmers have the choice to take more Mung and Moth Bean (Vigna Aconitifolia) so that, besides food, they could have some produce to sell for money.

Moth Bean (Vigna Aconitifolia) being less consumed compared to that of Mung (Vigna Radiata) is sown largely for selling purpose.

Also the rain fall determines the crop productivity. For timely rain fall, Pearl Millet gives good produce, whereas for late rain (late July), Green Gram and Moth Bean give better results compared to Pearl Millet. However these differences are unconfirmed and farmers go by their experiences over the years.

Pre-production

Land preparation

Land preparation starts just before the onset of monsoon i.e. from first week to last week of July. As the land is completely rain dependent, there is no specific time frame for land preparation.

The land is left fallow for six months (during Rabi/winter season) and it becomes hard with fully grown local bushes. The farmers leave their livestock (goat and sheep) in the field for grazing and their dung is left on the field to increase fertility. The animals are given feed in the fields if necessary so that they stay on the fields.

The preparation work begins in anticipation of the monsoon. Both men and women are involved in cleaning the bushes that had grown, using sickles and spade. As the family sizes are relatively big and cultivable land size is small, and mostly there is enough time before the arrival of monsoon, majority of the farmers do not hire labor for this work.

Ploughing

The hard sandy and rocky dry land is pulverized or smoothened by ploughing and harrowing with tractor which is hired from fellow farmers in the village.

Ploughing the hardened land is usually done by men using tractors.

Women and children clean the pulverized land by collecting the left over plants.

After land preparation, men prepare a boundary to prevent animals from entering the land during cultivation. While making boundary, children also help them.

Sowing

After the first rain, farmers immediately sow the mixed seeds either by broadcasting or using seed drill on hire. This involves both men and women, if sowing manually and women help men by filling the seed drill box if seed drill is used. The moisture in the land after rain is sufficient for the seeds to germinate and grow.

No transplanting is done for the crop because it requires additional labor and thus costs more. Also as the seeds are mixed and germinated in a mixed pattern, it is difficult for them to separate the plants and transplant.

Production
**Irrigation**

No irrigation facility is available in the land where Pearl Millet is cultivated. Hence farmers are taking mixed crops to ensure food security.

At least two spells of rains is required for the crop after germination and before the panicles start ripening. If there are three to four timely rains in a season, then that is said to be a good crop season for that year, which gives assured production.

**Weeding**

First hand weeding is done after 30 days of sowing. Agriculture being a family activity, both men and women are involved in weeding. They also hire some women laborers from outside during the first hand weeding.

Second hand weeding is done after 60 days of sowing. At this time only the family members of farmers are involved.

<table>
<thead>
<tr>
<th>Dhok</th>
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</tr>
</thead>
<tbody>
<tr>
<td>No machinery is used in weeding because all the three crops are mixed and it is difficult to use any machine for weeding which in turn involves expenditure in terms of rent or investment.</td>
<td>No machinery is used in order to reduce expenses. Only manual labor is employed.</td>
</tr>
</tbody>
</table>

**Weeding cost** First hand Weeding -5 members*  
Rs.250*3 Day = Rs. 3750 (Excluding family labor) (If second weeding is required, both men and women from the family do the work).

No chemical fertilizer is used in both villages. Women collect animal manure from their own animals or from road side and use this as fertilizer by broadcasting it in the agriculture field.

<table>
<thead>
<tr>
<th>Dhok</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Farmers are not using pesticides as a regular practice because this addition to the input cost does not significantly change the yield. Also the mixed cropping pattern helps in not spreading and restricting the pest to other plants.</td>
<td>Only in case of severe pest attack, they use pesticides by taking advice from pesticide shop in Baori or Osian.</td>
</tr>
</tbody>
</table>

**Crop protection:**

Birds are a major threat for the crops especially Pearl Millet. They protect the crops by putting scarecrows in the field. A field boundary constructed while land preparation and it protects crop from livestock.

**Post production**

**Harvesting**

**Decision for harvesting**

The farmer checks for the readiness (well ripen and dry enough) of crop for harvesting. In general Pearl
Millet is ready for harvesting at the earliest compared to Green Gram and Moth Bean.

Men and women both get involved in cutting the panicles manually. First they cut Pearl Millet panicles using sickle tools and then dry them under sunlight in the form of a heap.

After two to three days of drying, threshing is done either using thresher or manually. In this process, the grains are loosened from the straw and chaff by beating the harvested stems on threshing floor manually or using machine. Both men and women work together while threshing manually.

**Threshing**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting</td>
<td>Separate panicles from plants - 5 laborers*Rs.300*2 Day= Rs. 3000 per hectar</td>
</tr>
<tr>
<td>Threshing by machine</td>
<td>2 hours*Rs 500 = Rs. 1000</td>
</tr>
<tr>
<td>Collection</td>
<td>2 Laborers* 1 Day*Rs 350= Rs. 700 (excluding family labor) per hectares</td>
</tr>
</tbody>
</table>

Women fill the clean grain in gunny bags at the time of threshing time. Women separate grain from the threshed mixture through winnowing. They separate small stones, soil pieces, plant stems etc. from grain.

The stover that remains after harvesting and the chaff that remains after winnowing is used as fodder for livestock, for both goats and cows. The straw is stored outside in the form of a heap, whereas the chaff is stored inside a circular enclosure made with bricks and thatched roofing.

**Winnowing**

During winnowing, the grains from threshed mixture are removed from chaff.

However if the product is in a large quantity, manual threshing and winnowing becomes labor intensive and time consuming. Hence thresher is used where threshing and winnowing is done at a time.

In Govindpura, as the land size is comparatively big, all farmers are using threshers to extract grains from panicles.

**Chaff/ stray**

In Govindpura, as the land size is comparatively big, all farmers are using threshers to extract grains from panicles.
this small flour mill in their home as it saves lots of time and energy especially for women.

### Seed selection / storage

<table>
<thead>
<tr>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women grade the produce from their fields and keep the best for seed next year. They store the grains in an earthen container. Ash is mixed along with the grains in order to protect from insects and pests before storing. This signifies their knowledge of good seeds and preservation.</td>
<td>In Govindpura, farmers (male) buy seeds once in every three years and use the seeds produced from their farm for the following two years so that they will get assured high productivity as compared to that of local seeds and also the cost is reduced. However as the improved seeds cannot give the same good results every year, they have to buy seeds from the Block market Baori. When the seed is preserved for the next two seasons, women take care of selection and preservation of the seed.</td>
</tr>
</tbody>
</table>

Women manage the storage and maintenance of seeds and grains for consumption. This is kept in the house and the house is constructed in such a way that the grains are stored separately in a room, taking care to control exposure and insect attack.

### Marketing

Farmers do not sell the produce because Pearl Millet is used for food. Even if the production is more than their consumption in a certain year, they do not sell the extra Pearl Millet but store it for the next year as seed for sowing and also as reserve. Due to the uncertainty of rainfall and risk of crop failure, farmers make sure of their food security by storing the grains. If there is good rain fall and assured crop production in the next year, they sell the stored Pearl Millet in block market i.e. Chountan and Baori to meet cash needs. Some farmers give the grains to the relatives who have faced a bad crop year and are in need of food grains.

Men market the produce whereas women does not involve in the activities that are outside their farms. Social restrictions on women’s mobility and interactions and involving household chores, agriculture works and livestock rearing works put women within the village. In these works women do not have any decisions making power. These works put more burdens on women and do not facilitate empowerment to them.

<table>
<thead>
<tr>
<th>In Dhok, farmers sell surplus Pearl Millet at Chountan block, which is five km from the village. It is sold to local grain vendor in the block.</th>
<th>In Govindpura - Block market is in Baori</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce being less in quantity, men sell it in Chountan by taking it in bus or shared autos. They won’t sell collectively because farmers sell it individually the stored produce as and when they are in need of money.</td>
<td>Two to three farmers hire a pick up van to sell their produce in the block market, because they only sell surplus produce which is very less. This also helps them to reduce transportation cost.</td>
</tr>
</tbody>
</table>
Cost

Inputs

<table>
<thead>
<tr>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inputs and pre-production per hectare</strong></td>
<td><strong>Inputs and pre production per hectare</strong></td>
</tr>
<tr>
<td>Seeds - no cost</td>
<td>Seeds - no cost/ once in three years</td>
</tr>
<tr>
<td>Fertilizers - not used</td>
<td>Fertilizers – not used</td>
</tr>
<tr>
<td>Pesticides - not used</td>
<td>Pesticides - Hariyal sulphur Rs.100 / 5 kg – Rs.500</td>
</tr>
<tr>
<td><strong>Land preparation</strong></td>
<td><strong>Land preparation</strong></td>
</tr>
<tr>
<td>Ploughing using tractor on rent – 1 ha*5 hours * Rs. 600 per hour = Rs. 3000</td>
<td>Ploughing (tractor on rent) – 1 ha*5 hours * Rs. 350 = Rs. 1750</td>
</tr>
<tr>
<td>Labor for weeding and harvesting</td>
<td>Labor for weeding male Rs. 350; female Rs. 300</td>
</tr>
<tr>
<td>Male Rs. 300; Female Rs. 250</td>
<td>10 female per cycle= Rs. 3000 * 3 = Rs. 9000</td>
</tr>
<tr>
<td>5 male and 5 female per cycle= Rs. 2750 * 3.5= Rs. 7150</td>
<td>= 2 men @ Rs. 500 for 3 days = Rs. 3000</td>
</tr>
<tr>
<td><strong>Total Rs. 10150</strong></td>
<td><strong>Total cost Rs. 12750</strong></td>
</tr>
</tbody>
</table>

(Note: Mostly irrigated land famers use Vanish pesticide to kill insects in germination period. Its cost @ Rs. 350 per liter.)

Income

Income received from the produce in terms of money is not much because the farmers do not sell the food crop. However, they are getting grains as food. The cost of the food consumed for a year is given below.

<table>
<thead>
<tr>
<th>INCOME FROM THE PRODUCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop</td>
</tr>
<tr>
<td>Pearl Millet</td>
</tr>
<tr>
<td>Green Gram</td>
</tr>
<tr>
<td>Moth Bean</td>
</tr>
</tbody>
</table>

Information and knowledge

Women’s role in getting information on crop details starting from seeds to marketing is negligible, however they are marginally involved in selecting crops since the choice of crops is limited by the regional constraints. Though the farmers in Dhok are not purchasing seeds, they have information regarding improved seeds from the fellow farmers and ICISAT-GRAVIS.

Returns from their contribution

The Western part of Rajasthan is characterized by tough weather conditions and difficult terrain. The farmers grow food for subsistence and only very few short duration crops are cultivated for marketing. The possibility of inputs is limited.

Considering the terrain, agriculture is labor intensive where men, women and children have to work very hard for production of food. Women’s involvement in agriculture is very high in doing the physical labor work, but their role is limited, almost nil when it comes to any decision making activity.

Constraints and challenges:

- **Resources – land, inputs (seed, fertilizer, water, technology, labor, credit, etc.)**
  - **Land**
  
  Villagers have a minimum one acre to maximum 20 acre of rainfed land. Only 12 families have bore well facilities. Bore wells are not an alternative, considering the water depth at 500 feet, investment and chances of success. The Bhils and the Manganina communities in Dhok
are the vulnerable groups who have very less land (not more than one acre which is distributed by the government) or no land at all. These people are depending on wage labor and begging for food. As the land size is very small and there is not enough water, they are not able to produce enough food grains for their family.

- **Land or soil property**
  The land being mostly sandy and less amount of loamy, it is only suitable for highly drought resistant crops like Pearl Millet, Green Gram and Moth Bean. The sand lacks fertility and water retention ability which are the two important properties of a land for agriculture.

- **Inputs**
  Saved seeds of Pearl Millet are used to cultivate. However the local seeds are not giving as good yield as desired. Though improved varieties are able to give more productivity and in shorter duration, farmers are not willing to use these seeds as they have to buy the seeds and according to them, the taste of local seed is better than that of improved variety. Also, the fodder production from improved seeds is low as compared to local varieties.

  Water is the major constraint for agriculture in both villages. Also the ground water table is so deep that the farmers are not willing to invest money. This is the reason behind the farmers for not growing two crops a year. Hence the land is left fallow for the rest of the period.

  Chemical fertilizers are not used in the crops due to lack of water and costs involved.

**Technology**

Farmers are utilizing technology in ploughing, harrowing, seeding and harvesting. Medium and large scale farmers are able to use technology. But for small and marginal farmers, technology utilization has become a burden.

In Dhok two to five big farmers and in Govindpura, five to eight big farmers are able to use bore wells, micro irrigation - sprinkler system to supply water during Rabi season. Due to huge costs involved in these technologies, small and marginal farmers are not utilizing micro irrigation technologies in agriculture.

**Credit**

Farmers don’t take credit for agriculture because they are not spending much money on it. However, if they had to spend on labor, machinery and fertilizer they use their own money.

- **Information and training (education, literacy)**
  (e.g. of reasons – lack of institutions, services, lack of capacity of these, etc.)

  The literacy rate in the villages is very low. Reasons include schools being located far from the main villages, coupled with patriarchal values etc. It has lead to most of the women and girls not getting any formal education. There is only one class XI girl student in Dhok village and none in Govindpura. Depending on accessibility, girls study till class V in Govindpura. They are not allowed to go school outside of the village. Though schools are present, their infrastructure is not adequate. Insufficient staff is a major concern in the schools. Lack of education hampers the awareness levels of the women and their access to information on new technologies. In Govindpura, the school is located far from the houses of the villagers and because their houses scattered.

- **Limited capacity building and institutional support**

  There are no agriculture extension services in the villages. Technologies have been generated but they do not reach the needy in time due to lack of effective extension efforts. Though they have information about the technologies, they are not able to adopt them due to lack of capital, infrastructure support, and poor market linkages.

- **Formal institutions as information source**

  There is an information center in Govindpura intended to provide information about the agriculture to the villagers. It also works as a
meeting place. But an active engagement with the community is lacking. There is no vision or resources to play the role of information provider. In Govindpura, each household is located at a minimum distance of one to two km from each other, which is a major hurdle for them to meet collectively, communicate or share any information.

Since, women are always occupied with household as well as agricultural work, coupled with restrictions on their mobility, they face difficulty in coming together to take any collective action or share information.

The Gram Panchayat office in Dhok, acts as a meeting point for the villagers as well as any other officials coming to the village. This is only limited to specific programs taken up by government or private organizations. No regular facility is available to provide information about agriculture such as inputs, market. GRAVIS has started providing information about agriculture, though limited to selected families under the guidance of ICRISAT.

- **Labor**
  Though the entire family is involved in agricultural work, the labor intensive works like weeding, harvesting, threshing, winnowing etc requires a lot of manual labor for the entire village during a short period, which increases demand for labor but the supply is limited. Hence wage rates shoot up to Rs. 500/person/day. In Govindpura, wage rates are Rs. 350 to Rs. 500 for both male and female per day per person. In Dhok, wages are Rs. 250 to Rs.500 for both male and female per day per person. This increases the expenditure on agriculture.

- **Benefits**
  Low profitability is due to the lack of economic incentives. Millets have been treated as subsistence crops; it ensures food security to the people.

### Markets
Cultivation of millets is limited to consumption, but it is not market-oriented as the width of the market is shallow and effective demand is falling.

- The most common complaint of smallholder farmers is unstable market prices and the long distance from the village in case of Govindpura.

### Gaps
- Farmers depend on neighboring farmers or on the pesticide/fertilizer shops for information. However they too have limited access to changes happening in the field of agriculture. The near absence of any agriculture extension programme and information sharing is a huge gap.
- In Govindpura, the village head receives information about agriculture from NABARD through SMS by mobile phones service on inputs, weather conditions and market details. However this is not disseminated to the farmers in the village.
- In Govindpura, harvesting of the crop is delayed due to high cost of wage labor. This adds to the risk of crop failure considering unusual weather changes, as well as increases the expenses for the farmer.
- The crop is stored in open places which lead to insect and rodent attack and wastage.
- The villages are remote and thus transportation is an issue.
- Lack of exposure to new cultivation methods and reluctance to adopt possible new methods in agriculture.
- Women have no accessibility to information.
- Some farmers in Govindpura take their produce to block market collectively, whereas the others do not.
**Constraints and challenges faced by women:**

Women have no land title.

Cultural restrictions on women mobility prevents them to participate in meetings regarding livelihoods.

Girls are forced to drop out of education at an early age (10 years) and are engaged in house hold help, agriculture and livestock maintenance. This in turn led to their low literacy and exposure.

Their involvement in economic activities like agricultural inputs purchase, sale or produce is nil. This region is characterized by difficult terrain. Agriculture is difficult, sourcing water involves walking in rocky and undulating terrains, and water is scarce. They all take more time, if compared with plain lands. The household chores, agriculture work fill up the entire day for women. Coupled with the patriarchal values, restrictions on women’s access to mobility, education, exposure to outside world, or any collective platform, there is no possibility of any betterment in women’s status in these areas. Young women aspire to get education and hope for paid jobs, but unless there are interventions to make changes in the established norms and values, there is unlikely to be any changes.

Women have very little information around market or cash transactions. They do hard work in the fields, but these are all directed by the men. No major decisions are taken by women.

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**Trends and Opportunities**

- Cultivation practices

**Best practices**

<table>
<thead>
<tr>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowing improved seeds (hybrid), that are convincingly high in drought resistant and more productive as compared to saved seeds by selective farmers with the seed support by ICRISAT through a local NGO GRAVIS</td>
<td>Purchase improved seeds once in every three years;</td>
</tr>
<tr>
<td>Use of animal manure on time as per requirement</td>
<td>Hoeing to prevent weed growth there by reducing the burden of first hand weeding</td>
</tr>
<tr>
<td>Cutting panicle on time, good preservation knowledge and skills</td>
<td>Applying of pesticides at early stage of pest attack</td>
</tr>
<tr>
<td>Women add ash to the saved seeds to prevent pest attacks.</td>
<td>Harvesting at proper time, take labor from other villages, rent a tractor from other village if not available in village</td>
</tr>
<tr>
<td>Natural way of protection the crop from bird attack by keeping scare crow</td>
<td>Dry the crops properly in sun light and for prevention of bird attack cover the produce with thin polythene sheets</td>
</tr>
<tr>
<td>Dry the crops properly in sun light and for prevention of</td>
<td></td>
</tr>
</tbody>
</table>
bird attack cover the produce with thin polythene sheets
- Cleaning the grains before consumption and selling
- Women also grind the Pearl Millet of neighbors for money using their electrical flour mill

- **Technologies**
  - In Pearl Millet, hybrids and improved agronomic practices are lacking. The research focus should be on development and popularization of short duration and heat and drought tolerant varieties/hybrids to meet the food and fodder security of the poor.
  - New breeding efforts for value added characteristics, such as tolerance to drought, downy mildew, smut, blast, heat, and bird loss, should continue.
  - Machinery: Development of low cost machinery to take care of the high labor cost as well as timely practices. Developing appropriate small-scale machinery that eases labor scarcity and reduces drudgery for women in harvesting and threshing of grain is another important grey area for private and public investment.

- **Diversification and value addition of products**
  Value addition in millets is crucial to widen markets, for consumer acceptance, and to render cultivation of these crops remunerative for producers. Though the potential exists for bakery products, nutria foods, nutraceuticals and health foods, value addition in millets is in its infancy, with no research and policy support.

- **Institutions (seed banks, credit facilities, cooperatives)**
  - Building and strengthening existing institutions or collectives of farmers such as cooperatives and farmer clubs that provide collective strength in agricultural practices like purchase of inputs if any and selling the produce.
  - This also helps in accessing and sharing of information about best practices.
  - Providing formal credit to small and marginal farmers thereby reducing financial burden on them.
  - A common platform like Village Organization of SHGs that brings all the villagers especially women, are to be developed where they can communicate, share their experiences and information on agriculture as well as other livelihoods.

- **Markets**
  While Pearl Millet can substantially contribute to the food, nutritional, and economic security of small and marginal farmers, it is crucial to stimulate demand for them through value addition at the micro and macro levels with technological support and market-led extension in order to provide them some income from the same piece of land.

  So far in both the villages, Pearl Millet is grown mainly for the purpose of consumption.

In Dhok, as the land size is very small, it is not sufficient to provide them food grains as per their requirement for which they are depending on PDS and purchase from market or fellow farmers.

In Govindpura, as the land size is comparatively big and they are using improved seeds, they are only cultivating in a small portion of land (not more than 2.5 Ha) and the rest is used for cultivation of cash crops which gives them some income.
Women can be targets of the development activity, which would in due time, open up lots of possibilities. For example, if the seeds being distributed by ICRISAT are given to the women member of the household, it will make way for increased contact and knowledge and experience building which would empower the women.

- Infrastructure
  - Water resources
    - In both villages, Pearl Millet completely depends on rainfall and hence it is cultivated during rainy season. Even though some farmers have irrigation facilities in the form of deep tube wells, the scarce water is not used for cultivation and is reserved for Rabi crops (cash crops like Mustard, Cumin etc).
    - Millets need a number of enabling conditions, and these include enhancing the productivity of the rainfed lands where millets are grown. This could be achieved through special watersheds on millet lands and dovetailing government employment programs such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) to support millet cultivation from sowing to harvesting.

- Land
  Local perennial trees like Zyziphus (Ber), Khejri (Prosopis cineraria), can be planted in the common land by mobilizing the community so that they can get regular income in long run from them.

- Policies
  - Inclusion of millets in the PDS to make it a food and nutritional security program.
  - The government should introduce millet-based foods in the Integrated Child Development Services (ICDS), mid-day meals, social welfare hostels and welfare programs. These actions will open up new markets for millet farmers and revitalize them.
In Govindpura, Cluster Bean (Guar) is cultivated as a cash crop in kharif season, which works as a cash source for the farmers. Mustard, Cumin, Castor, Cotton are also important cash crops in the village. However these crops require irrigation facility, which is limited to a few families in the village. Sandy and loamy soil and dry climatic conditions being suitable for Cluster Bean, it is cultivated by almost every farmer in the village. This crop is a drought- tolerant, deep-rooted summer- growing annual legume. It is known for its nutrient fixing properties by living in symbiosis with the nitrogen fixing bacteria. Hence farmers cultivate it in crop rotation cycles.

Cluster Bean as a plant has a multitude of different functions for human and animal nutrition. Also its seeds which contains gelling agent (Cluster Bean Gum) are important in many industries especially food, pharmaceuticals etc which has high demand in global market. Thus it became an important cash crop of India.

India is the largest producer of (80% of the total produce) Cluster Bean in the world, of which Rajasthan, Gujarat, Haryana and Punjab are the major producers.

Value Chain Analysis

Inputs Stage

Land

The land in Govindpura is sandy and loamy which is suitable for cultivation of Cluster Bean.

Decision

As the land size is big in the village, farmers are able to choose how much Pearl Millet (Bajra) and Cluster Bean is to be grown.

Mostly men take all decisions of agriculture activities such land size for cultivation, seed selection, time of sowing, etc. Rarely men approach women for seed selection.

Seeds

Improved seeds are used for the crop to get more production with good quality. Hence they purchase seeds from private dealers in Baori market. Seeds like Upkar and Ulhas Jyothi are used.

Implements

Tractors are taken on rent for ploughing, sickle for cutting bushes and cleaning, polythene bags for seed preparation.

Pre-production

Land preparation

Land preparation starts just before monsoon i.e. during June.

The land which has been left fallow for the past six months (during Rabi or Dry season) becomes hard with fully grown local bushes. During these six months, farmers do not expend time on the land. However they leave their livestock (Goat and Sheep, Cows) in the land during this period.

Cleaning:

Both men and women involve in cleaning the land by cutting off the bushes using sickles and spade. Family members involve in the work.

Ploughing:

Ploughing the hard sandy and rocky dry land is pulverized or smoothened by ploughing and harrowing with tractor which is hired from fellow farmers. Ploughing is done to loosen the hardened land and pluck out the roots of previous plants. This also helps the fertile soil to come up so that the seeds can settle after sowing and grow well. This work is done by men using tractor as the land becomes too hard to plough manually. Women
clean the land by removing foreign material that came out after ploughing.

Men prepare a boundary with thorny bushes to prevent animals from entering the land. While making this, women and children help them.

After land preparation, farmer waits for the first rain of the season.

**Sowing**

Sowing period is in the months of July and August right after the first shower of the monsoon. After the first rain, farmers immediately sow the seeds either by broadcasting or using seed drill on hire. This involves both men and women, if sowing manually and women help men by filling the seed drill box. The moisture in the land after rain is sufficient of the seeds to germinate and grow.

The seeds start germinating one week after sowing.

**Production**

**Irrigation**

No irrigation facility is available in the land of small and marginal scale farmers. At least two rains are required for the crop after germination.

The medium and large scale farmers who have irrigation facility, provide water using sprinkler system and thus have chance for sowing in time and get good productivity.

In some cases women involve in arrange sprinklers for the crop.

**Weeding**

First hand weeding is done after 30 days of sowing. Women involve in weeding. They also hire some women from outside during first hand weeding.

Second weeding is done after 60 days of plantation. At this time only family members involve.

**Fertilizer**

Farmers, who have irrigation facility, apply urea and Di-Ammonium Phosphate (DAP) for Cluster Bean. However all farmers apply animal manure. Daily, women clean animal shed and collect manure and keep it in one place. It is used as a fertilizer, which was collected during the year by women.

**Pesticides**

**Diseases**

Teliya (fungi-like structure on the plants).

Though the farmers have no idea about the diseases, they use pesticides by taking advice from the pesticide sellers in Baori. Men do the purchase and application of pesticides to the crop. Women bring the water to mix with the pesticides.

**Post production**

Just after 20 days of fruiting, women collect some Cluster Bean fruits which are still tender and dry them in sun light. Then they store the dried vegetable by sealing from air, it is consumption as food (prepare curry) throughout the year.

**Harvesting**

Harvesting of Cluster Bean is done in the months of October and November.

Decision for harvesting- Once the Cluster Bean fruit is well ripen (as checked by the farmer), its color changes from green to yellowish brown. Then men and women both cut the plant two - three inch from its bottom.

This harvested crop is then dried in the field itself under sunlight for four or five days.

Well dried crop is then collected by male and female to a common point for harvesting, using tractor and thresher. This is then followed by winnowing.

Men carry Cluster Bean fagots from Cluster Bean field to common point for harvesting, Women make Cluster Bean fagots and some-times women also carry Cluster Bean Fagots.

**Products**

Cluster Bean seeds
Seeds from the threshed mixture are separated through winnowing. In this process, the threshed mixture is thrown into the air so that lighter and non-edible particles like straw remaining and broken pods get blown away by the wind and the heavy particles like grains and rocks (if any) fall down, which are then collected into bags.

After threshing women clean the rest of the threshing mix by winnowing. This winnowing is done by women as it is comparatively less labor intensive than that of threshing.

However if the product is in large quantity, manual threshing and winnowing becomes labor intensive and time consuming. Hence machinery is used where threshing and winnowing is done at a time.

As the land size is comparatively big in Govindpura, all farmers are using threshing machines to extract seeds from the pods.

**Chaff/ straw**

Cluster Bean is useful in feeding livestock too. The stems that remained after harvesting and chaff that remained after cleaning the seeds, is used as fodder for livestock – both goats and cows. Women store the fodder with the help of men outside in the form of a heap, or they themselves store inside a room constructed either with rocks or stems and take care of it.

**Value addition**

**For consumption**

This cash crop is also used as food by the farmers by collecting tender age pods and drying them up in sunlight for four or five days. This vegetable is then stored and used for curry preparation.

**For marketing**

After bringing the crop to home, it is again dried and cleaned from inner particles if any.

Men carry the bags for further drying process at home. Women dry the seeds under sunlight by spreading them on plastic sheets for another three days to reduce the moisture in order to prevent damage to the seeds. They regularly mix the seeds on the drying area to ensure uniform drying.

**Seed selection / storage**

Farmers buy Cluster Bean seeds instead of using saved seeds in order to get more production because the seeds collected from the crop are not capable of giving better result if sown.

**Marketing**

Men sell the Cluster Bean produce in block market Baori. Women, due to social restrictions do not involve in these activities.

**Local/ village market**

No specific market is there within the village. However some farmers in the village purchase Cluster Bean seeds from fellow farmers who have produced good quality seeds.

**Block market**

Farmer sells Cluster Bean seeds individually in the block market of Govindpura, Baori. However if the production is very less, then two to three farmers hire a pick up van or auto and take the produce to the market.

Some farmers do not sell the entire produce. They store some portion in their home. Whenever they require money, they sell small quantity of the produce in Danwara or Baori retail shops, but at lower than market price.

**End users**

The traders in the block market purchase the produce from the farmers and transport to the Gum and Bubblegum manufacturing factory in Pune and Mumbai etc.

**Costs**

Inputs per hectare

- Seeds 15 kg* Rs.100/-kg = Rs. 1500
- Fertilizers:  Urea 3 bags @ Rs. 300 each = Rs. 900
- DAP 2 bags @ Rs. 600 = Rs.1200
- Pesticides:  Zypsum Rs. 380/L, Capex Rs. 460/L, Retard (WP) Rs. 160/L total = Rs. 1000
- Empty gunny Bags: Rs. 10/bag * 25 Bags = Rs. 250

Total cost: Rs. 4850

**Land preparation**
Ploughing (tractor on rent) per hectare = 1 ha * 5 hours * Rs. 350/hr = Rs. 1750

Harrowing-1ha * 2hr * 300Rs./hr = Rs. 600

Sowing- Tractor charge: Rs. 2500/ha

Total cost: Rs. 4850

Production

Weeding and harvesting cost

First hand Weeding - 5 laborers (Female)* Rs. 350* 3 Day = Rs. 5250 (Excluding family labor)

(Second weeding is not done. If required, then family members do the second weeding).

Harvesting- 5 laborers * Rs. 500 * 3 Days = Rs. 7500

Threshing- 8 hours * Rs. 500 = 4000

Collection- 2 Laborers * 1 Day * Rs. 500 = Rs. 1000 (excluding family labor)

Total cost: 17750

Market

Transport charge - Pick up charge per bag to Baori Block market = 25 bags * Rs. 50 = Rs. 1250

Total cost = Rs. 28700 per hectare

End user - Cluster Bean gum making

Cluster Bean gum, also called Cluster Beanan, is a Galactomannan. It is produced from the endosperm, which is about 35-42 percent of the Cluster Bean seed mass.

The Cluster Bean seeds are used to extract this highly demanded water soluble Cluster Bean gum which is used in several industries.

The gum is commercially extracted from the seeds by a mechanical process of roasting, differential attrition, sieving and polishing.

The seeds are broken and the germ is separated from the endosperm. Two halves of the endosperm are obtained from each seed and are known as undehusked Cluster Bean Splits. Husk, is removed and separated from the endosperm halves by polishing. The refined Cluster Bean splits are then treated and finished into powder by a variety of routes and processing techniques depending upon the end product.

Cluster Bean gum which has almost eight times the thickening power as corn starch is used in dressings, sauces, milk products, and baking mixes.

India’s production contributes to 80% of the world’s total Guar production, figuring up to six lakh tons. Rajasthan wholly retains the credit for India’s position producing 70% of the production itself.

Income

Income per hectare = 8.75 Q per ha * Rs. 7000 per Q = Rs. 61250

Profit = Income - expenditure = Rs. 61250 - Rs. 39150 = Rs. 22100

Information and knowledge

Women role in getting information on crop details starting from seeds to marketing is negligible. Men, who used to decide about the cash crop selection, are now consulting women also.

Returns from their contribution

Though women are involved in every labor intensive work from inputs stage to post harvesting stage, they do not receive benefits either in the form of cash or kind. However they collect Green Cluster Bean for consumption throughout the year by drying and storing them, which provides them food security.

Women have lot of works in pre and post harvesting time. They have knowledge and skills in these works. They clean place for harvesting, involve in gathering Cluster Bean plants at the time of threshing. They do winnowing, cleaning grain and separating small stones, soil pieces and plant stems etc. These works require a lot of patience and skill.

Best practices
Crop rotation – interchanging the Cluster Bean crop with food crop in the following year, to get the complete benefits of its nutrient fixing property.

Transporting the produce collectively when production is less has reduced the cost for farmers to sell the produce.

Constraints and challenges – in regard to

- **Resources – land, water, inputs (seed, fertilizer, technology, labor, credit, etc.)**

  - **Land**
    - Land or soil property
    - Low fertile land is the major constraint that limits productivity.

  - **Inputs**
    - **Seeds**
      - High price of Seed, Fertilizers and Pesticides-
        Though the improved varieties are able to give more productivity and in shorter duration, they attract higher costs. Also the quality of inputs purchased is a question.
        
        No seed treatment is done prior to sowing.
        
        As there is no cooperative in the village, they are not able to get the benefit of inputs under subsidy rates.

    - **Fertilizers**
      - Due to lack of irrigation facilities, not all farmers are able to apply fertilizers to Cluster Bean.
      - At the time of sowing season the fertilizers are not available in the cooperatives societies.

    - **Pesticides**
      - Knowledge about the diseases is limited and hence depends on pesticide vendors.

  - **Water**
    - Water is the constraint for Cluster Bean cultivation. Hardly getting two to three rains a year and uncertainty in the season makes Cluster Bean cultivation uncertain.
    - Though some farmers have irrigation facilities, they are not able to use them fully because they have to store the water for Rabi season (summer).

  - **Technology**
    - Mostly marginal and small farmers are far away from technology as it attracts investment.
    - Big farmers are using bore wells, micro irrigation - sprinkler system to supply water during Rabi season. Small and marginal farmers utilize technology at the time of ploughing and threshing.

    Though machinery such as threshers are available, small and marginal scale farmers are not using them due to higher costs involved and small size of land.

    Charges are higher for tractors during the time of ploughing and sowing.

  - **Labor**
    - Unavailability of sufficient labor resulted in higher labor cost during rainy season (Kharif) especially during harvesting.

  - **Credit**
    - Credit is not a major problem for Cluster Bean farmers because they get loan from banks for agriculture. In short of money, they take required inputs such as fertilizers and pesticides from traders on credit. However this credit is only available at higher cost of 36% to 48% per year per Rs. 100.

    Though loan from SHGs is available at lower cost, not all families are able to get the benefit because the women have not yet joined in the groups.

Production
Delay in sowing due to late rains and labor unavailability.

Less rains during production result in drying up of crop.

Unexpected rain during crop ripening stage can cause crop damage.

**Harvesting**

Rains at the time of harvesting damages the crop & stray. Due to cloudy weather the crop doesn’t dry properly. This may completely damage the crop or if mild, takes more time for threshing and thus increases the production cost.

Low wind speed hampers the cleaning process. As it requires continuous wind for winnowing, women have to wait for a long time.

Loss at the time of sun drying is high due to the bird attack.

Women being occupied by other works such as collection of straw and festival season chores may not dry the produce properly. The moisture thus left may spoil the produce.

**Value addition**

There is no special price for different quality seeds in block market. Hence farmers are not adding any value addition like segregation of high quality seeds to get higher price.

**Information**

Though the village has an information centre that gives information about the prices, weather condition etc, that is not utilized by the farmers because it is located far from their houses.

**Markets**

Price fluctuation in the market – the prices rose to Rs. 140 per kg and fell down to Rs. 70, because of which many farmers kept the seeds within their houses waiting for price rise.

Some farmers sell the produce in small quantity (20 kg - 50 kg) at 7-10 days interval in Danwara or Baori or local shop owner at lower than market price to meet their daily cash needs.

Processing and trading of Cluster Bean are exclusively confined to Jodhpur, which is facing crisis at present. A recent advertisement has advised the farmers about the western demand for the produce and not to sell until the price hike. This condition has made many farmers retain their produce in home without any return and the industries are facing losses.

**Benefits**

Cluster Bean is a cash crop and gives income to the farmers. They also utilize it for consumption.

**Policies and legislative frameworks**

With majority of the Gum powder is exported and its elasticity of demand is high, short-run changes in market conditions can lead to large fluctuations in price.

**Opportunities and way forward**

- **Cultivation practices**
  Crop rotation with other food crops is very helpful as Cluster Bean is known for its nutrient fixing property in the soil. Crop rotation is one of the oldest and effective strategies. It means the planned order of specific crops is planted on the same field on rotation basis. The planted rotation may vary from two to three years or a longer period.

  Crop rotation is used to prevent soil depletion, maintain soil fertility, reduce soil erosion, control insect/mite pests, prevent diseases and help to control weeds.

- **Seed treatment prior to sowing**
  The concept of seed treatment is the use and application of biological and chemical agents that control or contain primary soil and seed borne infestation of insects and diseases. It also leads to crop production...
enhancement, crop safety and healthy and vigorous plants.

Seed treatment is used for increased germination, to ensure uniform seedling, and protect seeds and seedling from early season diseases and higher production.

- Inter cropping with Cotton
  Inter cropping means growing two or more crops simultaneously on the same piece of land. It is used for higher income, to act as insurance at the time of one crop failure, soil fertility, reduce soil runoff.

- Implementation of Non Pesticide Management (NPM)
  NPM means various pest control techniques which do not depend on chemical pesticides. It reduces agriculture inputs cost; it can be prepared with available materials, do not harm to cultivators and produce healthy crops.

- Institutions
  Provide improved seed and fertilizers at subsidized rate.
  Formation of farmers Cooperative to provide financial as well as information support.
  Promotion of low-cost farm implements.
  Promoting collective selling of the produce through farmers club or cooperative will reduce the transportation cost and increase their income.

- Markets
  Price stability is to be ensured by government.
  Jodhpur being the most important Cluster Bean processing industry and is located less than 60 km from Govindpura, instead of selling the produce to traders, the farmers can be encouraged to sell their produce collectively to the processors that are located near to them. Thus the farmers can get more price (price deciding power) and the processors in turn get the inputs at lower than the price they have to pay for traders.

- Infrastructure
  Establish ware houses under rural Godown scheme or NABARD schemes for scientific storage of the produce. They can store the produce until they get good price in the market.
  This in turn also promotes collective selling.

- Policies
  Being highly export oriented product, government has to take policies such as Minimum Support Price (MSP) that protect and stabilize the prices and encourage the farmers to hold on to this crop.
  Promote crop insurance for cash crops at lower premium for small scale farmers.
5.3 Green Gram and Moth Bean - Cash crops (Dhok)

In Dhok village, though farmers cultivate Pearl Millet as their food crop, they mix this crop with two pulses Green Gram (Mung/ Vigna radiata) and Moth Bean (Moth) as an insurance against erratic rain fall. This has been practiced in the village for several years and has become a tradition for a farmer to grow mixed crop without a second thought, because if rains are more, crops like Moth Bean and Green Gram give more production and if rains are less, Pearl Millet gives more production – either ways farmers get a food security.

Green Gram and Moth Bean are also consumed as food, but in less quantity in Dhok. They sell the remaining produce for money which makes them cash crops for the farmers of Dhok.

Value chain of Pearl Millet is already given in the previous section. In the present section, cultivation of Green Gram and Moth Bean together are discussed under cash crop value chain.

Apart from the farmers who have irrigation facilities, about 300 families in Dhok village who are small and marginal farmers depend on rainfed agriculture and are able to get some income from the mixed crop by selling the Green Gram and Moth Bean (not necessarily in equal proportion) depending on the production.

Value Chain Analysis

Inputs Stage

<table>
<thead>
<tr>
<th>Green Gram (Mung/Vigna Radiate)</th>
<th>Moth Bean (Moth/Vigna Aconitifolia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>They use saved seeds for sowing thereby reducing the expenditure as much as possible. This crop gets ready for harvesting in two to three months.</td>
<td>They use saved seeds for sowing to reduce expenditure. However recently, some farmers have received improved seeds from ICRISAT, through GRAVIS. These seeds get ready for harvesting within 45 to 60 days whereas saved seeds come to harvest after three months.</td>
</tr>
<tr>
<td><strong>Women involve in every step of seed preparation of the crop –</strong></td>
<td></td>
</tr>
<tr>
<td>Women who have saved the seeds from previous harvest (saved seeds), clean the seeds there by removing broken seeds for better germination. They mix the three seeds in certain proportion as explained in seed mixing section.</td>
<td></td>
</tr>
<tr>
<td>No specific seed treatment is done.</td>
<td></td>
</tr>
</tbody>
</table>

Land

Sandy land and dry climatic conditions of Dhok are favorable to grow the drought resistant crops like Green Gram and Moth Bean.

The small land holding size in the village is a concern for the farmers. Mixing these two crops along with Pearl Millet provides crop insurance for them. However women do not hold any land ownership in Dhok.

Decision

Green Gram and Moth Bean being highly drought resistant, they were the ideal choice to grow along with Pearl Millet.

Green Gram is the second most consumed crop after Pearl Millet as food in the village. This is also a reason behind its selection. Moth Bean is consumed less as compared to Green Gram.

They have been practicing mixed cropping as a routine for number of years. Hence men and women have common decision in mixed cropping in Dhok.

Seeds
Seed mixing
Before sowing, women prepare the seed mix by cleaning the already stored seeds of Pearl Millet, Green Gram, Moth Bean from infertile seeds. They mix them thoroughly with hands as per their requirement.

Sample proportion of seed mix is given below:
Pearl Millet (Bajra) being their staple food and more drought resistant is taken in large proportion – 60 – 70 % of the total seed.
Pearl Millet – 12.5 to 15 kg per ha
The second important food crop for the villagers, is taken in a proportion from 30 – 20% of the total seed.
Green Gram 5 to 7.5 Kg per ha
Moth Bean being third and optional (rare cases), is taken in relatively small quantity 10 – 20%.
Moth Bean 2.5 to 5 kg per ha

The seed proportion is determined depending on the farmer’s requirement and the certainty prevailed in the timely rain fall. If the farmer’s land is very small, they take major proportion of Pearl Millet (Bajra) as food crop. For comparatively big farms have a choice to take more Green Gram and Moth Bean, such that they can not only have food but also can sell for money.

Moth Bean being less consumed compared to that of Green Gram, it is majorly sown for selling purpose.
Also the rain fall determines which crop is going to give production that year. For timely rain fall, Pearl Millet gives good product whereas for late rain (late July), Green Gram and Moth Bean give better results compared to Pearl Millet. However the farmers are also uncertain about the differences in crop productivity.

Implements
Tools required for Pearl Millet (Bajra)) are enough for the mixed crop - Tractor on rent, Tools for cleaning – sickle, polythene bags for land preparation.

Pre-production
Land preparation
Land preparation starts just before the onset of monsoon i.e. from first week to last week of July. As the land is completely rain dependent, there is no specific time frame for land preparation.

The land is left fallow for six months (during Rabi/ winter season) becomes hard with fully grown local bushes. The farmers leave their livestock (goat and sheep) in the field for grazing and their dung is left on the field to increase fertility. The animals are given feed in the fields if necessary so that they stay on the fields.

The preparation work begins in anticipation of the monsoon. Both men and women are involved in cleaning the bushes that had grown, using sickles and spades. As the family sizes are relatively big and cultivable land size is small, mostly there is enough time before the arrival of monsoon, majority of the farmers do not hire labor for this work.

Ploughing
Land preparation is same in the case of Pearl Millet (For detail see page no: 40)

Sowing
After the first rain, farmers immediately sow the mixed seeds either by broadcasting or using seed drill on hire. This involves both men and women if sowing manually and women help men by filling the seed drill box if seed drill is used. The moisture in the land after rain is sufficient for the seeds to germinate and grow.

No transplanting is done for the crop because it requires additional labor and thus costs more. Also as the seeds are mixed and germinated in a mixed pattern, it is difficult for them to separate the plants and transplant.

Production
Irrigation
The entire crop depends on rain for water and is the reason why farmers are taking mixed crop. No irrigation is available here. At least two rains are required for the crop after germination. If there are
three to four timely rains in a season, then that is said to be a good crop season for that year, which gives assured production.

**Weeding**

First hand weeding is done after 30 days of sowing. Agriculture being a family activity, both men and women are involved in weeding. They also hire some labor from outside during first hand weeding.

Second weeding is done after 60 days of plantation. At this time only family labor is used.

No machinery is used during this process.

**Fertilizer**

Women apply the animal manure that was collected by them. No chemical fertilizers are used.

**Pesticides**

No pesticides are used, to reduce expenditure. Also the mixed cropping practice helps to restrict the spread of diseases.

**Post production**

**Harvesting**

<table>
<thead>
<tr>
<th>After Pearl Millet harvested, Green Gram gets ready by the month of October. By this time, the leaves dry down but may not drop off completely. The well ripened pods are cut manually with care and are dried under sunlight for four to five days. Well dried pods are then collected by men and women to a common point, for threshing.</th>
<th>After Green Gram harvesting, Moth Bean plants are de-rooted in November and dried under sunlight in the form of a heap for six to seven days, because the plant is still green and is to be dried well before threshing. Both men and women involve in de-rooting the plants and getting them to home after drying. <em>Moth Bean from improved seed comes for harvesting in 60 days and hence to be harvested before Green Gram.</em></th>
</tr>
</thead>
</table>

**Threshing**

<table>
<thead>
<tr>
<th>Women extract Green Gram grain from the pods manually by using wooden tool. These are then separated from the husk and stored. This is done by women.</th>
<th>Both men and women separate well dried pods and Moth Bean from the pods by beating with a stick. The threshed mixture is then separated from the plants and husk and stored for further cleaning i.e. winnowing.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Threshing and winnowing is done leisurely at home as per the convenience of women after completing household work.</th>
<th>As the quantity of Green Gram and Moth Bean is less, men help in threshing and do not involve further in any stage of post-production of these two pulses.</th>
</tr>
</thead>
</table>

| Women thresh the Green Gram pods in an open area followed by winnowing. | |

Harvesting of the mixed crop is done over a period of one to two months.
Figure 24: Threshing Moth Bean in Dhok

Figure 25: Winnowing Moth Bean in Dhok

Figure 26: Moth Bean preparation in Dhok
Winnowing

Seeds from the threshed mixture are separated through winnowing. In this process, the threshed mixture is thrown into the air so that lighter and non-edible particles like husk and chaff get blown away by the wind and the heavy particles like grains and stones if any fall down, which are then collected into bags.

Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Production</th>
<th>Seed Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Gram</td>
<td>2.5 Q per ha</td>
<td>5 to 7.5 kg</td>
</tr>
<tr>
<td>Moth Bean</td>
<td>1.8 Q per ha</td>
<td>1 to 2 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Products</th>
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<td>5 to 7.5 kg</td>
</tr>
<tr>
<td>Moth Bean</td>
<td>1 to 2 kg</td>
</tr>
</tbody>
</table>

Purpose and quantity used per hectare

<table>
<thead>
<tr>
<th>Purpose and quantity used per hectare</th>
<th>Green Gram (in quintal)</th>
<th>Moth Bean (in quintal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total production</td>
<td>2.5</td>
<td>1.8</td>
</tr>
<tr>
<td>Consumption</td>
<td>1 to 1.25</td>
<td>0.5 to 0.63</td>
</tr>
<tr>
<td>Saved seed</td>
<td>5 to 7.5 kg</td>
<td>1 to 2 kg</td>
</tr>
<tr>
<td>Sale</td>
<td>1.45 to 1.185</td>
<td>1.29 to 1.15</td>
</tr>
</tbody>
</table>

Chaff/stray

Both men and women bring the Green Gram plants that remained in the field after harvesting to home. They store the dry plants as a heap in an open area and use as animal feed.

Value addition

For consumption

<table>
<thead>
<tr>
<th>Value addition</th>
<th>Green Gram</th>
<th>Moth Bean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaned Green Gram</td>
<td>is consumed either in the whole form or is separated into two halves using a grinding stone called Chakki. This is then well dried and stored in a dark room. All the works are done by women.</td>
<td>Moth Bean is also saved and consumed in the similar manner of Green Gram. All the works are done by women.</td>
</tr>
<tr>
<td>They add ash to the whole grains before storing to protect from insects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Of the total product, a minimum of 40 - 50 kg of Green Gram is kept for consumption.</td>
<td>Moth Bean being consumed less; about 20 – 25 kg of it is kept for consumption.</td>
<td></td>
</tr>
</tbody>
</table>

For marketing

No specific value is added for both pulses, as they are not cultivated for selling purpose.

Seed selection and storage

Women segregate high quality seeds from the produce using sieves and winnowing fan. They store the grains by mixing them with ash in order to protect them from pests.

Marketing

Men market the produce whereas women does not involve in the activities that are outside their farms.

End users

End users are the farmers themselves.
As the arid region is short of vegetables, villagers depend mostly on these pulses along with the staple food of Pearl Millet.

**Costs**

**Inputs**

**Seeds**

| No cost is involved as farmers use saved seeds | Moth Bean involves no cost as farmers use saved seeds. But some farmers, who are willing to use the improved seeds, have to buy at Rs. 150 per kg. |
| Fertilizers - Animal manure is applied. Hence no cost. | (Mostly second weeding is not done but if required then only family members do the second weeding). |
| Pesticides - No pesticides are used. Hence no cost. | **Harvesting:** No external labor are hired as a very small amount is sown. |

**Land preparation**

Land preparation costs are not calculated separately for the crops because the costs are already covered under land preparation for Pearl Millet as shown below.

| Ploughing (tractor on rent) – 1 ha*5 hours*600 Rs. /hr= Rs. 3000 |
| Sowing-Tractor charge Rs. 1000/ ha |

**Production**

**Weeding cost (Note:** This cost is included in Pearl Millet cultivation)

| First hand Weeding -5 labor* Rs.250*3 Day Rs. = Rs.1250 (Excluding family labor) |

| Green Gram Rs. 40 per kg |
| If sold the entire production = 250 kg per ha = Rs. 10000 |
| Sold after consumption 125 kg = Rs. 5000 |
| Moth Bean Rs. 50 per kg |
| If sold the entire production = 175 kg per ha = Rs. 8750 |
| Sold after consumption 45 Kg = Rs. 5625 |

**Market**

**Block level market**

Cost of selling the produce in block market Chouhtan is Rs. 50 per bag for transportation. They sell Green Gram and Moth Bean together, thereby reducing transportation cost.

**Income**

**Information and knowledge**

Women who stay within the main village get information from neighbor women while winnowing and working in the field.

**Returns from their contribution**

Though women are involved in every labor intensive work from inputs stage to post harvesting stage, they do not receive benefits in the form of
cash. However they get food security from the produce.

Men, though not involved much as compared to women, take the monetary benefits after selling the produce.

**Constraints and challenges—in regard to**

**Land**

**Land size**

Land size is the major constraint for farmers in Dhok. Most of the small and marginal farmers without irrigation facilities are not able to produce required quantity that can be sold later.

**Land or soil property**

The sand lacks fertility and water retention ability, which are the two important properties that affect crop quality and quantity. However the crops help to retain and increase the nutritional factor of the soil with their vegetative manure. Though the sandy soil is suitable to grow Green Gram and Moth Bean, farmers are not able to grow other remunerative crops like Cluster Bean, which could have fetched them more money.

**Inputs**

**Seeds**

Productivity from the saved seeds is less as compared to that of promoted improved seeds.

Seeds are not treated prior to sowing because both men and women do not have knowledge about it.

Seed germination rate is uncertain as far as saved seeds are concerned.

Though improved Moth Bean varieties are able to give more productivity and in shorter duration, farmers have to buy seeds at higher price from the market.

Villagers didn’t find the improved variety seeds tasty despite of its high production.

Fodder produced from the improved variety is less compared to saved seeds. This is a concern for the farmers who depend on the crop fodder for livestock.

**Fertilizers and pesticides**

Chemical fertilizer like urea is not applied because they do not have the irrigation facility. Also farmers have the opinion that applying urea without water may damage the crop.

They are not willing to spend money on much fertilizers and pesticides because of the uncertainty of rainfall.

**Water**

Water is the major constraint for agriculture in the village. No irrigation facilities are available for the farmers, especially small and marginal farmers.

Rainfall being very less, they are not able to cultivate a single crop for food.

**Technology**

Though they are aware of technologies about irrigation and machinery, marginal and small farmers are not able to utilize them completely due to the financial issues such as high price and uneconomical.

Though machinery is used during land preparation, threshing is done manually.

**Labor**

Agriculture being non-remunerative, farmers are reluctant to spend money on labor.

Also the cost of labor increases during harvesting season, for a big farmer to hire labor.

**Credit**

As farmers are not spending much money in agriculture except during threshing, they are using their own money and not depending on credit.

**Production stage**
Lack of awareness about the diseases and pesticides, result in damage of the crop.

Open grazing of livestock is common; hence it is important to guard the crop from the animals. This demands the time of women.

Harvesting

Rain at the time of harvesting damages the crop.

Harvesting becomes difficult in mixed crop cultivation because different plants are grown together and while cutting one crop, the other immature crop get damaged.

Harvesting before the maturity of crop, result in lower yields, higher proportion of immature seeds, poor grain quality and more chances of infestation during storage

Delay in harvesting of Green Gram, results in shattering of pods and loss of grains.

Due to cloudy weather the crop doesn’t dry properly. This may completely damage the crop or if mild, takes more time for threshing and increase the production cost.

Wind speed hampers the cleaning process. Women have to spend a lot of time waiting for the wind for winnowing. This consumes a lot of time.

Post-harvest losses

There is a sizeable quantitative and qualitative loss of pulses during different post-harvest operations like threshing, winnowing, transportation and storage.

Value addition

There is no special price for different quality seeds in block market. Hence farmers are not adding any value like segregation of high quality seeds to get higher price.

Information

Men and women don’t have knowledge or information about the better cultivation practices of both Green Gram and Moth Bean.

Though some farmers have received improved seeds of Moth Bean, the others have not received seeds.

Institutions

Agriculture extension services are not available in the village. This is a big gap for the farmers to get information about inputs, market and better cultivation practices.

Markets

Farmers produce Green Gram and Moth Bean as crop security and for consumption. Also the size of land restricts the production of a household. This is leaving the farmers with loss of surplus of Green Gram and Moth Bean for selling. Hence they are not interested in selling the produce. This emerged to be a reason for the absence of market within the village. If any farmer who wants to sell the produce, he has to go to the block level market which requires time and money for transport. He is forced to sell the produce at the price of that day in the market, as decided by the merchant.

Opportunities

- Cultivation practices

Mixed cropping has several advantages in highly drought resistant arid areas – where it is considered as insurance against erratic rain fall. However, instead of mixed cropping, strip-cropping can be promoted thereby making it easy for cultivation as well as harvesting and also to maintain crop security.

Institutions

Provide improved seeds at subsidized rate.

Promote women collectives such as SHGs so that they can share their knowledge and information about different cultivating practices, their experiences in seed selection, harvesting and storage.
Promote farmers’ collectives such as farmers club or encouraging them to be active in cooperatives will help them to get information and collective benefits such as collective selling of crop.

**Markets**

Price stability is to be ensured by government so that farmers can get good income.

**Infrastructure**

The traditional water harvesting structures—tankas have the potential to provide irrigation facility in a small scale. This can be integrated with micro irrigation facilities like sprinkler and drip irrigation to provide water during emergencies.

**Policies**

Pulses can be included in the recently announced food security bill. This will boost the production of these highly nutritional crops not only in the village but also throughout the country.
5.5 Goat rearing (Govindpura and Dhok)

In both the villages – Dhok and Govindpura, livestock rearing is an integral part of farming and also an important activity of their livelihoods. Small farmers and landless agricultural laborers are increasingly depending on livestock rearing for their cash requirements and consumption. Among various species of livestock, goats play a vital role by providing milk and meat for nutrition and manure for agriculture. Goats can survive on a variety of vegetation like Babool, which is not useful for other species of livestock.

A stage-wise analysis of goat rearing is done in both villages, with specific focus on gender role in every stage. Value chain has described commonly for both villages wherever difference existing pointed.

<table>
<thead>
<tr>
<th>Inputs Stage</th>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of goats</td>
<td>3-4</td>
<td>15</td>
</tr>
<tr>
<td>Buck (male)</td>
<td>1</td>
<td>Purchase within the village from villagers or from Baori</td>
</tr>
<tr>
<td>Doe (female)</td>
<td>2-3</td>
<td>Breed not available</td>
</tr>
<tr>
<td>Purchase within the village</td>
<td></td>
<td>Fodder Pearl Millet straw, open grazing</td>
</tr>
<tr>
<td>Breed not available</td>
<td></td>
<td>Veterinary services nil</td>
</tr>
<tr>
<td>Fodder Pearl Millet straw, open grazing</td>
<td></td>
<td>Shed within the house periphery during kharif and left in the field during summer</td>
</tr>
<tr>
<td>Veterinary services – no vaccination or examination prior to purchase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shed within the house periphery during kharif and left in the field during summer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Requirements of shed**

Enclosure made by dry Aakda (Calotropis Procera) stems, locally available bush, stones if required.

The small ruminates have better coping capacity in the rough terrain like this region. They can climb rocky path and eat leaves from thorny bushes and have low maintenance cost.

**Purchase**

Men buy the goats when needed. Purchase is done only once as animal gives birth to two kids a year and hence it is not required to purchase further.

Men buy the animals when needed. Purchase is done only once as animal gives birth to two kids a year and hence it is not required to purchase further.

**Labor**

No external labor is employed for rearing the animals.
Pre-production

Shed construction

<table>
<thead>
<tr>
<th>Dhok</th>
<th>Govindpura</th>
</tr>
</thead>
<tbody>
<tr>
<td>No specific sheds are constructed but a boundary wall is built with the stems of locally available bush called Aakda. They tie the animals in the shed during night and also in rainy season.</td>
<td>These sheds are constructed with rocks and locally available grass</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Figure 27: Goats in open shed in Dhok</th>
<th>Figure 28: Goats Shed in Govindpura</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Figure 29: Different types of goats sheds in Dhok</th>
</tr>
</thead>
</table>

Both men and women and children involve in making shed for the animals using the locally available bushes. Daily women clean the shed and collect the dung which is further used as manure in the fields.

Feeding

<table>
<thead>
<tr>
<th>Fodder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women store the Pearl Millet, Green Gram and Moth Bean straw left in the field after harvesting for summer. Chaff that is separated from the cereal during threshing and cleaning is also stored in a specially constructed</td>
</tr>
</tbody>
</table>
storage rooms by women for feeding the ruminants in summer. During drought and migration situations women take more responsibility in collecting fodder.

| Animals are taken for grazing during rainy season because there is availability of green pasture in the government land. Mostly girl children are engaged in taking the animals for grazing. This is the reason behind the high dropout rate of girl children at the age of 10 years especially in Bhil community. | Women take care of feeding the animals the entire year. They feed them the stored fodder – Pearl Millet straw and chaff during summer. They also chop the branches of Khejri tree to give as fodder for livestock. |

### Veterinary services

| No specific veterinary services are sought unless illness is noticed. Men take the animal to the block Chountan veterinary hospital for treatment. | No specific veterinary services are sought unless illness is noticed. The animal is taken to the Baori block veterinary hospital for treatment. |

### Cost

**Input cost**
- Purchase of goats - Rs.4000 * 2 goats = Rs. 8000
- Shed construction – no cost is involved because they use locally available grass.
- It involves two members for three days to collect grass, timber to construct the shed.
- Veterinary charges = Rs. 20 per goat
  = Rs. 20 * 2 times * 4 goats = Rs. 160
- Charges for man to take goats to veterinary clinic = Rs. 20 * 2 times = Rs. 40
- Total = Rs. 200

**Health mix during kidding (for a pair of mother and kid) – Jaggery – Rs. 10 per day for 7 days = Rs. 70**
- Cost of health mix per annum for 2 kidding * 4 goats = Rs. 70 * 2 kidding * 4 goats = Rs. 560

**Input cost**
- Purchase of goats - Rs.5000 * 15 goats = Rs. 75000
- Medicine = vaccination – Rs. 50 * 15 goats = Rs. 750
- Medical services = Rs. 500 * 2 times = Rs. 1000
- (Mostly people use traditional treatment for goats. There is no regular health checkup for goats. Tanki (water container)= 1500 lit(for 10 goats)

**Production**
- During rainy season, the goats are taken for open grazing as there is abundant pasture during rains. Mostly girl children of the Bhil community are engaged in grazing the animals.

**Feeding**
- During rainy season, the goats are taken for open grazing as there is abundant pasture during rains, by men.
### Milking

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production: Half to one liter per day/goat for six month in a year. This milk is consumed by the households but not for sell. Sometimes they give milk to the neighbors with free of cost.</td>
<td>One lit./day/goat for six months in a year (3 - 3 months 2 time), Villagers consume the milk and remaining milk sells in the village at Rs. 20 per liter or in Baori dairy unit at the price of Rs. 30 per liter.</td>
</tr>
<tr>
<td>Women milk the animal regularly. However men also involve occasionally.</td>
<td>Women milk the animal regularly. However men also involve occasionally. While women sell the milk in the village, men sell it in the Baori dairy unit.</td>
</tr>
</tbody>
</table>

#### Figure 31: Milking in Govindpura

#### Figure 32: Goat manure in Govindpura

### Kidding

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two kids per goat per year of which 50% are male (Buck).</td>
<td>Two kids per goat per year of which 50% are male (Buck). Young bucks are sold at the age of eight months to 10 months at the price of Rs. 3500 per animal.</td>
</tr>
<tr>
<td>Women cook Pearl Millet with jaggery to prepare a health mix and feed it to both mother and kid for 10 days. This helps to improve fat content in the milk and thus the kid grows healthier.</td>
<td></td>
</tr>
<tr>
<td>Women take care of the kids by feeding and cleaning them daily.</td>
<td>In Govindpura, male bucks are kept for longer period (10 to 15 months) as compared to that of Dhok and sold in Block market for meat purpose. Availability of water and fodder makes it feasible for them.</td>
</tr>
<tr>
<td>Females are kept for longer period for breeding whereas the males are kept for shorter duration. They keep male kids until six to 10 months of age and then sell (further details are provided in marketing section). Lack of sufficient fodder and water, limits their ability to keep more animals or hold them for longer durations.</td>
<td>In case, if any animal dies accidentally (due to fight, accident etc but not due to any disease), the meat is used for consumption by the Bhil community. Other communities, who are vegetarians, hang the dead animal to a tree in an open area so that carnivorous’ birds can eat them.</td>
</tr>
<tr>
<td>In case, if any animal dies accidentally, as most of the villagers are vegetarians and are located far from other families, they hang the animal to a tree in an open area so that carnivorous birds can eat them.</td>
<td></td>
</tr>
</tbody>
</table>
Dung

Dung is collected by woman while cleaning the shed (in stall feeding). It is left in the agricultural land if the animals are left for free grazing.

Woman collects dung and cleans the shed. Dung production one tractor trolley/ year

Veterinary service

Men take the animal to nearby hospital in Chountan if the animal is too sick otherwise it is kept in the house only.

Men take the animal to Bawri block for veterinary service.

Value addition

In both villages, people are practicing traditional veterinary methods. Goats suffer Anthrax, Foot and Mouth diseases, Goat Pox and Peste Des Petits diseases etc.

Value addition

For consumption

Milk

No value addition is done for the milk because it is produced in very less quantity. The milk is consumed by the family for tea and buttermilk.

Milk is sold in the village or the nearby market after keeping minimal amount to meet the family needs for tea and butter milk. Hence no value addition is done.

Marketing

No milk is sold by them. Men sell the male bucks at a tender age of 6 – 10 months to a merchant who comes from Pune once or twice a year. He purchases from the village in a lot. Some villagers within the village also buy male bucks during festivals or other occasions and offer them to Viratra temple. Female goats are also sold within the village.

Milk sells within the village at Rs. 20 per liter as well as in Baori block, milk collecting unit at Rs. 30 – Rs. 35 per liter. Men sell the male bucks in the block market.

Men sell the animal to the traders as well as villagers.

Milk is sold by women if villagers come to their home. Men take the milk to Baori milk unit for selling.

In market, male bucks’ prices depend on weight, age and healthy appearance. Generally traders exploit the people taking advantage of lack of knowledge about market.

Income

Income table

Returns

Milk - Nil

Milk sells within the village at Rs. 20 per liter as well as in Baori block, milk collecting unit at Rs. 30 – Rs. 35 per liter. Men sell the male bucks in the block market.

Milk - 1 lit.*15 goat* 30 day* 6 months * Rs.20/lit. = Rs. 54000

Two goats per annum at Rs. 3000 per animal = Rs. 6000

15 young male animal * Rs. 3500= Rs. 52500
Women: Despite of taking care of animals throughout the year, they don’t receive much return. They get milk for consumption. Women in Govindpura sell milk from home which earns them a little money.

Men receive the money earned by selling milk as well as animals for meat, though they don’t take care of the animals much as compared to women. Goats serve as emergency savior during health problems, functions etc.

They get high fertile manure for agriculture at free of cost.

Non-Vegetarians consume meat during functions and get-togethers.

Constraints and challenges—in regard to Purchase of animal

<table>
<thead>
<tr>
<th>As there is no source or market for goat near by the village, villagers buy them within the village.</th>
<th>Villagers buy goats from the nearest block market Baori or within the village.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information on good breeds for milk and meat is a major gap in both villages.</td>
<td></td>
</tr>
</tbody>
</table>

Inputs

<table>
<thead>
<tr>
<th>Lack of fodder is a major reason why villagers from Dhok don’t keep more than three to four goats.</th>
<th>Govindpura villagers are forced to buy fodder because they need to keep more animals from which they get income from milk and goats sale.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Though the in house/ stall feeding of the animal benefits in gaining more weight in short period, they are not practicing it. This is due to inadequate fodder, water and lot of time and labor to be invested. Hence they send them for forage during rainy season.</td>
<td></td>
</tr>
</tbody>
</table>

Fodder

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
</tr>
</tbody>
</table>

Water is the major constraint for livestock during summer. The government tank is the only source of water for the animals.

In case of medical emergencies, they have to spend money to take them to the block level hospital.

No health camps are conducted by government officials in the villages.

Veterinary services

No veterinary services are available within the village. Hence vaccination for the new born kids is not done in Dhok.

Credit

Figure 33: Goats in open shed in Dhok

Figure 34: Water Tank for livestock in Dhok
They don’t take credit for the maintenance of animals because the number of animals is very less. Very few families depend on livestock as major livelihood. So they take loan from relatives but not from any formal institutions.

**Information and training**
Though there is a research institute located in Jodhpur, information about best practices of goat rearing is not reaching the villagers.

**Labor**
The practice of grazing goats by a shepherd is not present in the village. This consumes lot of time and labor of the women and children in taking care of them.

<table>
<thead>
<tr>
<th>There is no market for goat milk neither in the village nor in the nearby market i.e. Chountan.</th>
<th>Milk has high price in the block market (Rs 30 – 35 per lit) whereas it is less within the village (Rs 20 per lit). But the villagers prefer to sell milk within the village because block is located at 19 km from the village and transportation is costly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no specific market for the animals. Villagers have to wait till the merchant comes from Pune to purchase animals. The trader does not weigh the animal scientifically. He lifts the animal and as per his previous experience, calculates the approximate weight. There is huge scope for exploitation in this method of weighing.</td>
<td>The male animals are sold in the block market at the available prices. However the fluctuations of price make them uncertain about their expected return.</td>
</tr>
</tbody>
</table>

Low veterinary health coverage
Inadequate fodder and feed
Natural calamities like frequent droughts

**Livestock development programmes**
Rajasthan government is implementing goat development programs for the benefit of goat rearing poor families’ development. In Rajasthan goat population is 37.94% in total livestock population and 18% of India’s total goat population. Government is promoting three well-known breeds of goats such as Jamunapari, Sirohi and Marwari breeds. This program is aimed to help in improving the weaker section of the people; those who are depend on goat rearing. In this program
government distributes Sirohi bucks to goat rearing people those who belong to Below Poverty Line (BPL) families @ Rs. 600 per buck and Jamunapari bucks @ 1200 per buck to the SC, ST and BPL families.

**Opportunities**
- Cultivation practices
- Restarting the practice of goat rearing by a single person for 10 or more households who takes the animals for grazing during rainy season and watering and takes care of them throughout the day at a minimal cost of Rs. 20 – 30 per goat per month. This practice can save lot of time and energy of women and girl children and also check school dropout.
This practice in turn can generate livelihood for poor people.

- **Technologies**
  - Breeds that can tolerate water scarcity and give more number of kids in a year, are to be promoted so that it can fetch more income for them.
  - Fodder varieties that can grow in arid regions in summer, are to be introduced in the village so that the large barren land can be taken under usage and used as pasture land for animals.

- **Diversification and value addition of products**
  - Collective selling of goats in higher markets will fetch more money.

- **Institutions**
  - Bringing awareness about the best breed goats that are suitable for the environment is to be done by the existing institutions and extended services.
  - Formation Common Interest Groups (CIGs) to access livestock related schemes, from animal husbandry, agricultural departments.

- **Markets**
  - Establishing block level animal market. Accurate measurement of the animal is to be ensured while selling the animal in the market.
  - Local milk collecting unit is to be started within the village at the common point i.e. Groceries shop so that the villagers need not travel longer distances to sell milk. They can also get higher price from this centre.

- **Infrastructure**
  - Provide water sources for the animals by construction of more tankas by the government through the MGNREGS. The villagers can get work as well as infrastructure for their animals.
  - A sub-center for veterinary services can be started in the Gram Panchayat.
  - As veterinary services are not available within the village and it takes high cost to get the service, training a local villager (Para vet), preferably woman on treating small veterinary problems of the animals like vaccination, medication for common health problems, proper breeding etc will help the villagers to get better services at a lower price and in return, the woman can also generate some income through her service.
6 Way Forward

The people in Govindpura and Dhok are living in difficult and fragile environment. They face hardships in accessing basic facilities. Basing on the study we recommend some activities and interventions commonly for both villages wherever specific pointed as follows....

Water

Looking at the erratic and low rainfall, one of the most important issues for the communities is water. Any long term effort in harvesting and storing rainwater is of primary importance. Irrigation is a problem because the ground water level has gone deep hence less water demanding crop varieties are to be introduced in the villages

- Construction of rainwater harvesting tankas, in individual households or one common for each three to four families in the Bhil community in Dhok
- Construction of check dams to increase the ground water level
- Establish common micro irrigation for a small group of farmers -Form small groups with marginal and small scale farmers whose farm fields are nearby
- Provide micro irrigation facilities such as drip irrigation

Agriculture

Rain-fed agriculture coupled with uncertainty about the duration and extent of rainfall, leads to very little scope of experimentation around the crops, especially by the small and marginal farmer. The need for hardy, short duration crops for food is very critical.

- Encourage mixed cropping practice is to be streamlined scientifically
- Promote land based intervention, like horticulture, kitchen garden; any other marketable crop for income would be of immense value to the farmer.
- Promote usage of urea as fertilizer in Cluster Bean, which is a regular practice is to be addressed because Cluster Bean itself is known for its nutrient fixing properties in the soil
- Encourage collective purchase of inputs and selling of the produce in the market. This can reduce the cost of purchase and transportation
- Promote Non Pesticide Management (NPM) method
- Promote intercropping instead of mixed cropping eliminates the difficulty in weeding and harvesting
- Encourage to applying fertilizers immediately after it rains will help farmers to add fertilizers in a small quantity that can increase their productivity
- Bring the unused temple land under cultivation – by introducing drought resistant grass seeds which in- turn provides food security for the livestock in summer season in Dhok
- Facilitate to plant Ber/ Indian plum is tolerant to saline water irrigation to some extent
- Promote more penetration of high yielding varieties of Pearl Millet, Green Gram and Moth Bean
• Establish storage, grading and collective selling, would help the farmers in getting a better income and price

• Organized ‘Kheti Melas’ where pictorial presentation of different aspects could be made, and where different agriculture implements, inputs, seeds, organic manure etc. could be sold. This should be organized in the village or very close by so that majority can access

**Extension services**

There are no extension services that reach these villages. No formal institutional channel which would take information on new inventions related to agriculture, water harvesting, implements, government schemes etc. to the farmers. In the absence of which, farmers are left with no choice but to make do with what they know or what the farmers around them are doing. They also depend on the seed/ pesticide/fertilizer shop dealer, who will have a vested interest

• Establish extension services, especially at a time of extreme unpredictability around the climate

**Institutions**

There is no noticeable or active groups in the village, and the terrain does not make it any easier to group meetings either.

• Bring the community together in groups to discuss farming, access information, better seeds and inputs would go a long way in strengthening agriculture

• Strengthen the existing institutions such as farmers clubs and SHGs by providing continuous capacity building

• Establishing information centers for farmers to access information about new varieties, better cultivation practices, market etc.

**Women in agriculture**

There are many restrictions on women and they are largely confined to the households, spending time in chores, helping in agriculture and livestock. As soon as farming moves to the market sphere, women have no access. In a focused group discussion with women while they were working in setting up drip irrigation pipes field to cultivate Jeera (Cumin), and another group harvesting Cotton, they confidently responded to all the questions around the agriculture field, on land preparation, rotation, watering, pest attack etc, but any question that was on the world outside the village, that where the seed is from, which shop, how much does it sell for, is the payment made in full or part at the time of selling, is there a contract with the vendor, where is the pesticide/ fertilizer bought from, they had very little information and responded that the men would know.

In a deeply patriarchal society, the men would not, on their own, see the need for women to have this information. Women also, may not want to question the status quo, considering they are already overburdened. There is a need for institutional intervention and it will need to be very different as because of the terrain and the restrictions on mobility, it may not be easy to form women’s SHGs or get them in groups and actively engage on issues. The lack of mobility of women in these parts reflects in the fact that in public transport women pay only 70% of the fare.

• Design certain concrete benefits with the agenda of creating a space to discuss and take action on many aspects like food security, climate change, water, agriculture extension, access to credit etc

• Form women Self Help Groups and provide continuous capacity building

• Encourage savings and credits, opening bank accounts

• Establish village level women federation and facilitate women to participate village development activities

• Channelize all interventions through women. For example, the seeds that are being distributed by ICRISAT could be given to the women, in the presence of the men, or in a village meeting, and a discussion held on the trial of the seed, which would create a platform for discussing many issues
which are of immediate concern to agriculture and them
- Taking women on exposure visits
- Involving women at grassroots level and planning time and resources

Livestock

Livestock rearing is one of the important livelihoods to the people in both villages. Particularly small, marginal farmers and agriculture labours are increasingly depending on livestock rearing. An average 13% income comes from livestock rearing to the people. Goats are largest number in the livestock.

- Train women on basic veterinary services like vaccination, treatment for common diseases, weight measurement etc
- Restart the practice of goat rearing by a shepherd for 10 or more households who takes the animals for grazing during rainy season and watering and takes care of them throughout the day at a minimal cost of Rs. 20 – 30 per goat per month. This practice can save lot of time and energy of women which can be spent in a more productive way.
- Starting a local milk collection unit within the village at a common point, so that the villagers need not travel 20 km every day to sell milk in the Baori milk unit.
- Bring veterinary services to the village by training a paraveterinary within the village, so that the villagers need not travel long distances for the service which otherwise consumes a lot of time and sometimes is the reason for negligence of veterinary services in the village
## Akshara Livelihoods Private Limited study team details:

<table>
<thead>
<tr>
<th>Akshara Team</th>
<th>Qualification</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. Muralidhar, Chief Mentor</td>
<td>PGDRM (IRMA)</td>
<td>27+ years in Poverty Reduction, Livelihoods, Value-chains, Visioning and Strategic Planning</td>
</tr>
<tr>
<td>Anuradha Pati</td>
<td>MA (Social work, TISS)</td>
<td>17+ years in Gender and Collectives</td>
</tr>
<tr>
<td>Nilendu Mukherjee</td>
<td>MBA</td>
<td>9+ years in Business, Research, Collective Marketing</td>
</tr>
<tr>
<td>T. Venkateshwarlu</td>
<td>MA (Sociology, KU)</td>
<td>12+ years in Livelihoods, Social Mobilization and collectives</td>
</tr>
<tr>
<td>S. Laxman</td>
<td>MA (Sociology, OU)</td>
<td>9+ years in Livelihoods, Handlooms</td>
</tr>
<tr>
<td>K. Ramesh</td>
<td>MA (Sociology, OU)</td>
<td>6+ years in Field Research, Project /Finance Support</td>
</tr>
<tr>
<td>Dharmendar Singh Yadav</td>
<td>MBA and PGDRDM (NIRD)</td>
<td>3+ years in Livelihoods, Rural development</td>
</tr>
<tr>
<td>K. Krishna Chaithanya</td>
<td>PGDRB (BIRD)</td>
<td>2+ years in Rural Banking, Livelihoods</td>
</tr>
<tr>
<td>Heeralal Patidar</td>
<td>PGDRDM (NIRD)</td>
<td>&lt; 1 year Rural Development Professional</td>
</tr>
<tr>
<td>Anil Purbiya</td>
<td>PGDRDM (NIRD)</td>
<td>&lt; 1 year Rural Development Professional</td>
</tr>
</tbody>
</table>
The CGIAR Research Program on Dryland Systems aims to improve the lives of 1.6 billion people and mitigate land and resource degradation in 3 billion hectares covering the world's dry areas.

Dryland Systems engages in integrated agricultural systems research to address key socioeconomic and biophysical constraints that affect food security, equitable and sustainable land and natural resource management, and the livelihoods of poor and marginalized dryland communities. The program unifies eight CGIAR Centers and uses unique partnership platforms to bind together scientific research results with the skills and capacities of national agricultural research systems (NARS), advanced research institutes (ARIs), non-governmental and civil society organizations, the private sector, and other actors to test and develop practical innovative solutions for rural dryland communities.

The program is led by the International Center for Agricultural Research in the Dry Areas (ICARDA), a member of the CGIAR Consortium. CGIAR is a global agriculture research partnership for a food secure future.

For more information, please visit

drylandsystems.cgiar.org