# 5. Results and Discussion

### 5.1. Bias and problems in data collection

The first intention was to interview 50 men and 50 women of the Raika shepherding community in Godwar area. The total of 100 was chosen on the basis of a 90% confidence interval and a population size of about 50.000 in Godwar area (personal communication Hanwant Singh Rathore). Unfortunately due to time constraints, sickness and absence of a translator at some times no more then 59 interviews were done. In Appendix 5A a list of respondents and their age, sex, village and education is displayed. The interview guide used during the interviews can be found in Appendix 5B. For logistical and practical reasons interviews were done in a 30 km radius from Sadri. In this research area of about 1414 square kilometers the population size of shepherding Raikas is roughly estimated somewhere between 3.000 and 10.000. The results from every single interview can not be seen as individual responses of one household member, although this was the first intention of the research. Some individual interviews became group interviews and visa versa. Sometimes the interview was started of with one person and ended up with the whole family, neighbors and school children joining in. I choose not to interfere in this situation because I felt that in this way much more "rich" and important information (which otherwise would not have come up) was gathered. On the other hand, there were situations were group interviews ended up in individual interviews because people did not have the time to finish the interview or because one particular person (men) would take over the interview, this happened especially in the case were women were supposed to be the respondents.

Women and men have different responsibilities related to work, possess knowledge of different things, and have different perspectives and priorities in daily life. Therefore gender disaggregation of data was a critical method. It would have been easier or even necessary that the research interacted with local women separately from men because asking separate groups of men and women the same questions will result in information on gender differences in knowledge and perceptions and gender specific problems, needs and interests. This however posed a big problem in the present study. Apart from being interrupted by men during interviewing women sometimes felt hesitant and reluctant to talk in front of men. Since the translator was male this situation posed a problem almost every time we approached women for the interview. Raika men were surprised and could not understand that I wanted to interview their wives instead of them because "they [women] don't know about sheep, at least nothing more then we [men] know". Methods of research, interview techniques and the way to approach women need different approaches compared to that of men due to cultural and religious norms and in many cases it needs special and



careful preparation. In this research these aspects were underestimated adding to this was the fact that no female translator was found to conduct the interviews with.

This resulted in only seven interviews with Raika women. Therefore I want to stress that the data gathered during this research is generally from the viewpoint and perception of Raika men, and most probably underestimates women's knowledge and contribution to sheep rearing. This already became evident during some interviews where women were present. When men were stating for example that they were responsible for herding or treating sick animals women would sometimes tell that they also regularly take responsibility in herding or treating animals. In paragraph 5.10 the research results on gender labor division will be presented and discussed with the foregoing in mind.

Another constraint during the interviews was that people sometimes felt hesitant to talk about such things as income and land ownership. Where possible these data have been compared with existing literature on the subject.

In the research proposal it was stated that a workshop was to be held as a evaluation and verification method of the research findings and as a means to analyze local problems and reach consensus about priorities for action. It was meant to include all relevant stakeholders of the research area. In this case, local NGO's, veterinarians, fieldworkers, Raika sheep pastoralists (men and women) and traditional healers. An important aspect of the workshop would have been that the Raika were able to give feedback on the research findings. This workshop would have provided an opportunity to validate ethnoveterinary practices and identify the most adequate treatments for the main sheep diseases and to establish communication between the Raikas and government veterinarians which has always been problematic. Unfortunately logistical, practical and financial constraints did not allow for such a workshop but in the future, if NGO's or GO's are aiming to improve animal health in general and animal healthcare services in Godwar area (both conventional and traditional) such a workshop would provide a useful tool. Apart from the obstacles and problems in data collection as mentioned above there were also some unplanned positive developments and opportunities during the research period. First of all the two week stay at the village of Pachunda Kalan near Sojat Road provided me with a unique opportunity of living with a Raika family, participating in daily activities and insight into cultural aspects and labor division of Raika men, women and children etc. The almost daily visits to villages and camel herds nearby to treat animals provided me with some insight into disease prevalence and the functioning of governmental hospitals and veterinarians. Furthermore the visit of Dr. Evelyn Mathias on 19 February to 8 March 2001 to Sadri in order to evaluate the projects implemented by LPP and LPPS also proved very helpful for the presented research. Among other things she provided me with comments on the questionnaire and still continues to be a rich source of information and comments.



## 5.2. Flow diagram of Raika agro-pastoral system

On this page a simple flow diagram of the Raika agro-pastoral system is displayed.

In the next paragraphs each of the components and flows will be discussed. In the flow diagram the household is treated as a "blackbox", in practice however intra-household relations, labor division and allocation of resources play a crucial role for the functioning of the system. In this thesis one of these aspects –labor division according to gender- will be discussed.





## 5.3. Land ownership and crop production

Because sheep and camel breeding are specialized activities of the pastoral community of Raika which often keep them in migratory management systems, it is not to say that Raikas do not engage in crop production. In fact most Raika households combined crop production during the rainy season with (nomadic) pastoralism for part of the year. Of all households interviewed 45% did own a piece of land for crop production, 55% responded not to have land in ownership. This is not to say that 55% does not engage in crop production. Some Raika households rent a piece of land for part of the year or sharecrop with others.

Of all land owning Raika families the following distribution could be made, see table 5.1.

SIZE, IN BIGHA, (1 BIGHA = 0.34	NUMBER OF
HA)	LANDHOLDINGS
1-2	3
3-4	4
5-6	6
7-8	2
9-10	0
11-12	1
13-14	1
15>	1

Table 5.1. Number and size of landholding in ownership (n=18)

On average land holdings are found to be around 1.8 ha per household.

Agrawal (1998) found a slightly higher figure for Patawal village in Jodhpur district. Based on 57 households he found the average landholding of Raikas to be 2.1 ha, as compared to the charans and Patels who are from higher caste and cultivate crops and have landholdings of 10.2 ha per household. The bhils and meghwals occupy the lowest position in the caste hierarchy. They hold a little more land than the Raikas do. On the other hand, they possess very few animals.

Of the different crops grown by the Raikas wheat and maize were mentioned most often, in 8 and 7 cases respectively. Furthermore Sorghum is grown to serve as animal fodder (mentioned 6 times), lentils were mentioned 4 times and finally vegetables were mentioned once.

# 5.4. Local breeds and their qualities

With the small holders as target population, projects have to deal with the resources available at these farm levels, including livestock. Though there is a large number of breeds in India, more then 80% of India's livestock population are of local, non-descript types.



Therefore, improving livestock resources and their management means for the small holders first of all improvement of their herds. Breeding as the improvement of a particular breed is for many farmers of second priority.

The traditional system of sheep production of the Raikas has developed in response to climatic and other aspects of the environment. The sheep kept in Rajasthan are generally hardy animals, highly adopted to extreme climatical conditions such as long drought periods and high temperatures. The majority of sheep in the Indian sub-continent are small, coarse woolled and thin-tailed. One exception is the fat-tailed Bhakarwal breed. Sheep have traditionally been given the name of the state or administrative district where they are normally raised but over the years many administrative boundaries and names have been changed. Since female sheep are usually not exchanged between castes, sheep are also caste specific, which makes classifying the breeds even a more difficult job. This already became apparent when reviewing different sources; FAO, Indian government and some literature on the classification of the different sheep breeds in Rajasthan. The Indian government uses a geographical breakdown as regards the distribution of sheep according to fleece type and productivity (Devendra et al, 1982) Furthermore it sees the type of sheep in Rajasthan as a breed group named bikaneri with several varieties such as Bagri, Chokla, Magra, Nali and Pugal. Gatenby (1991) also uses the word bikaneri to describe the type of sheep found in Rajasthan and distinguishes between Bagri, Buchi, Chokla, Jaiselmeri, Magra, Malpura, Nali, Pugal and Sonadi as different strains of the bikaneri breed.

The most extensive information source found was that of DAD-IS. DAD-IS is a databank on Farm Animal Genetic Resources implemented by the FAO, covering information from around the world on different animals species. DAD-IS is the key communication tool for implementing the Global Strategy for the Management of Farm Genetic resources (AnGR). It is being developed first to assist countries and country networks, and also serves as the virtual structure for the Strategy. It will increasingly provide extensive searchable databases, tools, guidelines, a library, links and contacts (FAO, DAD-IS, 2001).

Sixty sheep breeds are identified in India according to this database, 11 of which can be found in Rajasthan. An overview was made of all (known) and officially recognized (by Government) sheep breeds in Rajasthan see Appendix 5C, information was adapted and modified from the DAD-IS databank.

For the present research classification according to the various information sources mentioned above proved to be a big problem. Raikas use local names and several names are used for one specific breed and these names even differ between villages in the research area. Furthermore some sheep breeds may be caste specific, since female sheep are not sold or traded outside the caste and as stated before, more than 80% of India's livestock



population are of local, non-descript types. Resulting in the possibility that the sheep breeds as used by the Raikas in Pali-district may not have been recognized or described.

Another option would be the classification of breeds on the basis of phenotypes but as can be observed from Appendix 5C it is sometimes hard to distinguish between different breeds on the basis of color and specific visible traits. Especially the distinction between Pugal and Marwari and Jaisalmeri and Nali may be very hard in practice.

For these reasons a classification was made on the basis of local names, descriptions and qualities of breeds, and where possible national names –as used in Appendix 5C- are given.

Raikas use a classification based on phenotype and production qualities of a breed. The following local names were used for the different breeds; Boti, Bhagli, Wannermi, Tepli, Dumi, Keri, Kajeli and Jaisi. Information was gathered through interviews, observation (pointing to sheep and asking for it's breed name and characteristics) and by showing pictures of the different breeds and asking respondent to give the name used for the particular breed. In the following section the characteristics and qualities of the different breeds will be summarized.

The qualities of the **Boti** breed lay in it's ability to cope with extreme climate conditions, low forage availability, resistance to diseases and endurance (Marwari is probably the breed name nationally used). This breed is kept mainly for its wool. In drought years this breed is said to be preferred above all the other breeds mentioned. This breed is a local breed from Godwar and Marwar area. It is a medium sized animal with black face, white body, short tail and very short ears (see picture 5.a.).



Picture 5.a) Bhagli breed (left) and Boti breed (right), Datiwara village, Bali tehsil



The **Bhagli** breed is kept for its milk and meat producing qualities, it is a medium to large sized animal with long, width, leaf shaped ears and dark, light brown or reddish face and white body. It's production potential is higher then that of the Boti breed but only under reasonable conditions it is able to do so. This breed is said to be more susceptible to diseases then the Boti breed especially under poor conditions therefor this breed is preferred in areas and years with better forage availability. This is a local breed originally coming from the Mewar area.

The *Dumi* breed is not a local breed. It's homestate is Gujarat, still it is kept in Rajasthan in reasonable quantities. It is like the Baghli breed kept for its milk and meat producing qualities. Characteristic about this breed is its round and hooked muzzle, furthermore this breed has long legs, long ears and medium sized to long tail. It's face can be a combination of brown, black, white or reddish colors according to the respondents, see picture 5.b.



#### Picture 5.b.) Dumi breed, Ghanerao village, Desuri tehsil



The *Keri* breed is a small to medium sized animal, it is a local crossbreed from Marwar area. It did not become clear which breeds are crossbred to produce this crossbreed however. It's main characteristic is it's two-colored face, mostly a combination of black and brown, reddish and brown or black and reddish (see picture 5.c. and 5.h.). Keri with small and long ears were observed as well as animals with long and small tails. This breed is not kept for one specific purpose, most probably depending on its parental breeds it is kept for wool, milk and meat or a combination of these.



Picture 5.c) Keri breed

The *Tepli* breed is characterized by it's very long ears and long legs. It's face is either black or white, but black is most common. This breed is kept for meat and milk production see picture 5.d.

*Wannermi* breed has a lot of similarities with the Boti breed, it is a local crossbreed of which one of the parents is most probably from the Boti breed. It's wool is of good quality but this breed was also mentioned to be kept for milk and meat production. This breed is well adapted to poor forage conditions.

The *Kajeli* breed is kept for it's meat producing qualities. It has a white, sometimes reddish face with a black colored patch around its eyes, it can have small and large ears, see picture 5.e. and 5.f.). This breed is produced by crossbreeding a local with an exotic breed. It was not clear which local and which exotic breed were meant. (Kajeli could be equivalent to Magra).





Picture 5.d) Black Tepli, Datiwara village, Bali tehsil

Picture5.e) Kajeli breed





### 5.4.1. Breed diversity within herds

Breed diversity per herd does not seem to depend on herd size. Small herds were observed with more then 5 different breeds and big herds would consist of only one or two breeds and visa versa. The average herd consists of 2,7 different breeds with a minimum of 1 breed and a maximum of 6 different breeds per herd. Forty three Raikas were asked how much breeds they had. This resulted in the distribution as shown in figure 5.1.



Of all the breeds the Boti breed scored highest both in absolute number per herd as well as in presence per household, meaning that in 31 (72%) of the 43 herds the Boti breed was present, followed by the Bhagli breed which is present in

42% of all herds. The Boti breed has generally always been kept in larger quantities than the other breeds and it seems that in years of extreme drought and low fodder availability people prefer to breed or cross breed with a Boti ram, resulting in a higher percentage of Boti breed or Boti crossbreeds in a herd. On the other hand in better years people prefer (cross) breeding with Bhaghli or other breeds.

For information on the other breeds mentioned earlier see figure 5.2. Some breeds could not be identified for several reasons; some were crossbreeds and they could not be classified as a specific breed (especially if they were crossbred with an exotic breed from out of state e.g. happens while on migration) or people had different names for one breed or disagreed with each other on the breed name.



There are three recognized goat breeds in Rajasthan, the Sirohi, Marwari and Parbatsari goat. The Marwari goat is black and has a good reproductive rate, but fairly low milk yields. The Sirohi and Parbatsari goats are multi-colored and produce good amounts of milk.



Earlier there were attempts to upgrade the local goat population by crossbreeding with exotic goats from Switzerland. These attempts were unsuccessful because these exotic breed proved not to be able to adapt to the extreme drought conditions in the area. Since the improved goat is not as hardy as the local breeds she needs a different approach. She needs better management and requires better forage availability. Introduction of exotic breeds can also implicate a change in (gender)-labor division, generally putting a bigger workload on women.

Traditional pastoral groups such as the Raikas are often accused of clinging to an outdated way of life and representing drains on national economies. But the contribution of pastoral societies to the maintenance of bio-diversity in domesticated animals and their role in keeping otherwise barren tracts of land habitable can not be measured in terms of money. This circumstance should be widely acknowledged on an international level and be reflected in comprehensive programs that support these traditional systems of land utilization.

The loss of hardy animal breeds, (such as the Boti breed) means a reduction of the part of the world that can be utilized by humankind. A shrinking of the human habitat is taking place just at a time when human populations are expanding at an accelerated rate and can least afford this. (IK Monitor, 1993)

The heightened public awareness about the need for conservation of biological diversity and associated knowledge system in the recent past, has largely remained restricted either to wild life or crop biodiversity conservation. Only recently has some serious notice been given to the cause of animal germplasm conservation. Even in this case, the role indigenous knowledge plays in generating incentives for conservation and utilization of germ plasm has not been appropriately appreciated (Gupta, 2001).

The government of Rajasthan is doing away with its earlier programs of cross-breeding the sheep with the exotic animals imported from Australia, the USA, New Zealand and Canada. The government's cattle breeding farms at Jaipur, Fathepur, Chittorgarh and Churu have closed down. The climatic conditions in Rajasthan are different and the off-springs (as a result of cross-breeding) have failed to withstand the heat of Rajasthan. Not one improved sheep breed such as Avivasta, Aviklin and Sardasamand was observed among the herds of the Raikas. The government seems to have changed it's policy in favor of the promotion of (improved) local breeds. In the research area some Boti rams with small eartags were observed within respondent's herds, after inquiry it became clear that these rams were freely distributed by the government.



### 5.5. Herd size and composition

There is a lot of difference in herd sizes between households, ranging from 10 sheep in one family to 400 in another family. In figure 5.3. the distribution of herd sizes over the different households is displayed.

The average herd size of the respondents (n=55) is 85 sheep with a variance of 63. Since all



families interviewed also owned goats the same information could be calculated for number of goats per family. Average number of goats kept per family is 24 with a variance of 16. The smallest goat herd size consisted of 3 goats and the biggest goat herd size consisted of 60 goats.

Sixty-six percent of all households have between 1 and 25 goats in their herd, 33% of all households kept 26 to 50 goats and one respondent had 60 goats. Keeping of mixed herds of goats and sheep has several advantages. Goats can serve as wet nurses for lambs whose mothers have died. Furthermore goat milk is often used for making tea. Goats are more resistant to diseases then sheep and during the dry season goats are advantaged because trees and bushes are the only green vegetation of which goats can make better and more efficient use. During the dry season it could be observed that goats looked more healthier and had a better body condition compared to the sheep in the same herd. Since the demand for goat meat has increased and fetches higher prices then mutton the selling of kids forms an important part of the family income especially during the dry season. The lean to fat ratio in goat meat is generally wider than in mutton and goat meat has a relatively low energy and high protein content compared to mutton. Another advantage of keeping a mixed herd is that goats also lead the herd and make it easier to control the sheep. Sheep on the other hand have the advantage that they produce wool, milk, meat and dung of which the dung is of better quality and more wanted by farmers then goat dung, sheep wool get better prizes then goat hair and sheep can be shorn up to three times per year. Goat hair is only cut once a year. Keeping of mixed herds can be seen as a means of spreading risks, it produces more different products and probably also causes that income is more evenly spread throughout the year. In figure 5.4. percentages of goats related to total herd size are presented.





Raikas in the study area are more specialized sheep breeders then they are goat breeders, their herds generally consist of only a small percentage of goats, generally ranging from 11%-35%. This margin is probably the optimal margin in the given ecological and management conditions and net returns per (mixed) herd are maximized within this margin. Having more then 35% of goats in a herd can mean that net profits per herd will fall because although goats fetch higher prices for their meat compared to mutton, meat is their only tradable good (milk is used for home-consumption), along with dung but goat dung is not much wanted compared to sheep dung. In the study area ecological and management conditions are such that sheep are generally favored. Going more to the west goat are more and more favored and capable of producing given the local circumstances. Going from Jodhpur in the south-center of Rajasthan to Jaisalmer in the west of Rajasthan the rainfall is reduced (see Appendix 5D) and becomes a serious limiting factor for vegetation growth, under these circumstances goats (and camels) are generally known to survive better then any other species. Going from the study area to the west the percentage of goats related to the total herd size rose. In the more drier western desert areas herds were observed in which goats outnumbered sheep. In the Thar desert region in western Rajasthan there are generally no mixed herds kept, only goat herds are kept. One literature source was found which supports this observation. "Many of these sheep pastoralists do not live in the most arid districts of Western Rajasthan, residing instead in Pali and other districts in central Rajasthan. Goats in contrast are herded by most households in the [drier, western] area [Jaisalmer, Barmer and Jodhpur districts] " (Robbins,n.d.)



#### 5.6. Grazing systems and feeding management

Sheep from the age of 5 to 6 months are herded daily. Shepherds will leave with their herd between 09:00h and 11:00h in the morning and return somewhere between 17:00h and 19:00h in the evening. The distance they travel with the herd basically depends on fodder and water availability in the area and herd size. Normally a distance between two and seven kilometer is traveled. Often the herding is done by the adult male member of the household sometimes accompanied by his daughter or son. A long stick of approximately 3 meter in length with on the end a saw attached is taken along. This is used to cut the branches of trees such as *Acasia nilotica* and *Azadirachta indica* of which the leaves and pods serve as animal fodder. *Azadirachta indica* or Neem tree is also used widely in Rajasthan to cure wounds and to relief animals form ecto- and endo parasites. It has antibacterial, antiseptic and anthelmintic properties. Sheep feed on these leaves and pods and the branches are taken with on the way back home to serve as fire wood.

Common Property Resources (CPR) available for grazing for the Raikas can be divided in:

Village commons or *gochers,* these are village grazing grounds used for the grazing of local livestock. Their use is being regulated by the *panchayat.* 

*Orans,* these are grounds belonging to a temple and they are supervised by a local priest, cutting of trees within these orans is forbidden.

Waste land, not suitable for crop production.

Fallow land, for part of the year -when under crop production- this land is private property but during the fallow period land is opened up for common use.

Sometimes the Raikas make use of a reserved forest belonging to the state government, in this case they have to pay fees every time they enter the forest and for every animal that is grazed.

### 5.6.1. Migration

Forty households were asked if they migrate with their sheep in search for more grazing ground. 65% (26 households) responded not to go on migration. Reasons for not going on migration included; herd size is to small (64%), not enough family members to go (27%) and a combination of the two (9%). Twenty-eight percent (11 households) responded to go on migration. From these household migration would take from 2 months to up to 10 months. The average size of herds going on migration was 136. This figure is higher then the overall average size of the herds in the research because for big flocks it is impossible to find sufficient forage in the local area and going on migration implicates that a lot of costs have to be made (transportation, consumption, bribing officials etc) therefore it is not profitable to go



with a small herd. Three households responded that they would only go on migration (7.5%) when it would be absolutely necessary (fodder scarcity or extreme droughts). Later on during the study it turned out that this figure would probably be much higher, because when people were specifically asked what survival strategies they have in years of extreme drought they would generally reply that they would go on migration.

Raikas migrate towards the east into Haryana, Uttar Pradesh, and Madhya Pradesh in herding camps each known as *dang. Dangs* comprise anywhere between 8 and 20 flocks. "While on migration, Raikas camp keeping in mind two basic requirements- fuelwood for cooking, and sufficient water for the sheep and their own needs. The particular fields in which they camp may be private, government or village land. The Raikas tend to prefer fields which have irrigation- especially from a tubewell as it can be used for sheep as well as their own drinking, cooking, and washing needs. Farmers also have a clear preference for having shepherds fold sheep in fields with irrigation because fertilization by sheep manure provide better crops" (Agrawal, 1992).

#### 5.6.2. Fodder scarcity

The majority of constraints for production according to the respondents can be divided into two categories; high mortality and disease prevalence among sheep and fodder scarcity.

Although the Raikas have always been confronted with fodder shortages due to the harsh climate the problem seems to have gotten worse recently. Droughts are becoming more devastating. The drought now taking place in Rajasthan is India's worst drought for many years affecting some 50 million people and an equal number of livestock. During the research many wells were already beginning to dry up because of the drought.

"Though this is already the worst drought most people here can remember, they feel its effects have been exacerbated by the growing desertification of the area and the long-term disappearance of pasture" (BBC News, South Asia, May 2001).

With fodder scarcity becoming a permanent problem, farmers resort to privatization of crop residues which have traditionally been utilized as a common resource (Shanmugaratnam, n.d.). Other factors also seem to begin to play more crucial roles in the availability of fodder resources. The availability of grazing lands has considerably been reduced for several reasons. Non-livestock rearing caste are keeping more livestock. Increase in livestock has over crowded the permanent pastures and other grazing lands which results in depletion of the grazing lands and soil erosion due to trampling of livestock resulting in decreased livestock carrying capacity, this is illustrated by the picture in Appendix I.

More people are changing from traditional rain fed agriculture to irrigated agriculture due to agricultural modernization with the consequence that crops can be grown year round and the fallow period of the land is reduced considerable. So where first the land lay fallow for



several months per year for the pastoralists to graze their sheep they are now losing out on these grazing resources. Consequently groundwater is being exploited at a higher rate then the rates of recharge.

Rajasthan has also experienced population growth rates above the national average. The general trend has been one of decreasing private an common land resources per capita while the livestock population (especially goat an sheep) has been growing. The main thrust of State Intervention has been privatization of lands customarily regarded as common resources. This has led to an ever-growing scarcity of grazing resources without adequate compensation in the form of produced fodder or other substitutes (Shanmugaratnam, n.d.). The percentage of land designated as permanent pastures and other grazing lands and forests is extremely low. Rules considering grazing are unclear, to little land is opened up as should for grazing and to much money is charged by the forest department were also mentioned during the interviews. The respondents mentioned that the *Panchayats* (village committees) are closing communal grazing grounds in order to plant trees. Various studies have shown that the *Panchayats* in Rajasthan have failed to develop management systems for the pastures belonging to them. This results in insecure grazing rights, especially for lower castes, and degradation of grazing lands.

Strategies employed by the Raikas to cope with these problems are walking extra kilometers or going on migration. Buying of extra fodder was not an option for the majority of respondents. Selling of animals was seen as a last option by some of the respondents.

### 5.7. Breeding

The rams are generally selected in their first week of birth. Selection criteria used include; body condition (weight and strength) and general appearance. While the selection is mostly done by men the women take care of the lamb. Once a lamb is selected it is given special attention. It is allowed to drink all the milk from it's mother sometimes even supplemented with the milk of 2 or 3 other ewes. Furthermore the lamb is given oil and turmeric, in some cases ghee, eggs and extra fodder is supplied. From birth on all sheep and goat are given names. These names mostly reflect special characteristics like for example, funny shaped ears or a specific color pattern. Even in herds of more then hundred sheep every individual sheep or goat is recognized. In several occasions it was observed that animals actually recognize their names when called and respond by approaching it's caller.

Most Raika households (65%) raise their own breeding ram but sometimes other rams e.g. from the village, from within the family or from the neighbor are used, this depends mostly on the quality of the ram. Rams for breeding are used for serving at the average age of 1.9 years (22.7 months) and ewes at the age of 1.6 years (see Appendix 5E, for detailed age distribution). The age of the rams used for fist service was found to be significantly higher



than the age of the ewes at first service. Rams are used for up to 3 to 4 years and usually families have two or more breeding rams available (depending on herd size, mostly one ram for 40 - 50 sheep). These breeding rams are often of different breeds.

Forty three households were asked about the frequency of lambing per year. Number d lambing per year heavily depends on fodder availability and thus the ewes' (and rams') body condition. Since the last two years were extreme drought years ewes generally (58%) gave birth only once during the last year.

Of all herds were lambing occurred once a year 43% have their lambing season during the rainy season (July till mid-September), 33% have their lambs born during the whole year except in the dry season and 24% have their lambing season in winter (December to March). Of all herds were lambing occurs twice yearly (28%) lambs are generally born in rainy and winter season (89%). The dry season (April-June) is generally avoided for lambing since fodder availability is scarce during that period.

When interviewees were asked if they use methods to control breeding they all confirmed that they do. The method of controlled breeding is simple but effective. A rope is tied around the scrotum and sheath around the penis of a ram when he reaches sexual maturity, the rope prevents the penis from reaching erection but the ram is still able to urinate. The rope around the scrotum is probably used to keep the rope around the sheath tight and to prevent the rope from becoming lose and falling off, see picture 5.f. A similar "device" named "kunan" is used in sub-Saharan Africa to control mating (Devendra *et al*, 1982).



Picture 5.f) Kajeli ram with "device" to control mating, Dungli village, Bali tehsil



Apart from using this system rams are also separated from the ewes and kept with lambs whenever possible (e.g. at night).

The rope is generally used for 3 months per year, so it can be prevented that lambs are born during the dry season. Young animals (under 6 months) are taken care of at home where they are provided with water and fodder. Most of the households have more then one corral to separate several groups from each other, e.g. young lambs and rams are separated from the rest of the group or sick sheep are separated from healthy animals.

### 5.8. Returns from sheep rearing

#### 5.8.1. Milk

Meat and wool is sold in all households (n=45), dung is either sold or traded for wheat. While on migration sheep are folded in farmers fields in return for free grazing farmers profit from the fertilization. Milk is mostly used for home consumption, only one respondent (2%) mentioned that milk is also sold occasionally, in 5% of all cases ewes were said to not produce enough extra milk for home consumption. Ghee (butter oil) is not sold but used for home consumption. It takes approximately 10 liter of milk to produce 1 kg of ghee. When sold 1 kg of ghee can fetch prices ranging from Rs 80 to Rs 100 (1 rupee = 0.021 US\$). Sixty-seven percent of all respondents use ghee for home consumption, the other 33% responded not to have enough milk to produce ghee. Ghee is used on special occasions or offered to special guests. In some cases it is also offered to the gods and used for making candles which are lit at the house altar during the daily prayers. Ghee has a high nutritive value being high in protein and energy content, this makes ghee highly valued while on migration when other energy and protein sources are scarce.

#### 5.8.2. Wool

Wool is cut 1 to 3 times per year . Seventy four percent of all interviewees (n=27) shear their sheep three times a year, 22% shear their sheep twice yearly and only in one case (3.7%) sheep are said to be shorn once a year. Wool prices have been fluctuating heavily during the last years with prices ranging from as low as Rs 2 per sheep to Rs 15 per sheep. This year wool prices were relatively low but prices fluctuated during the whole year. Twenty-one interviewees were asked what amount they earned per sheep, on average people earned Rs. 4.9 per sheep. However the spread of these responses is big, the variance of the responses is 4.6. Prices from Rs 2 to up to Rs. 10 were mentioned. For larger herds professional wool shearers are contracted, they earn between Rs. 2 to Rs. 3 per sheep. Wool buyers visit the sheep rearing families twice or three times per year to buy the wool. These wool buyers then sell the wool to larger companies in the cities fetching prices ranging



from Rs 20 to Rs. 30 per kg. (which is Rs. 10 to Rs. 21 per sheep). These companies select and clean the wool after which they sell the wool for prices ranging from Rs. 50 to Rs. 70 (which is Rs. 25 to Rs. 49 per sheep).

One sheep produces approximately 0.5 to 0.7 kg of wool. Because wool prices have been highly variable the income generated from wool sales also differ considerably per household in one household the income from wool sales accounted for only 4% of the total income while another household managed to get 24% of total income out of wool sales (see Appendix 5D).

With the overall prices of the raw carpet wool remaining almost stagnant for the last two to three years, the sheep breeders in Rajasthan, the largest producer of wool in the country, are now switching over to the production of meat in greater quantities. Meat is also being exported from Rajasthan to the Gulf countries and the prices fetched are considered much remunerative. The wool prices have remained more less at a level of Rs 20 per kg to Rs 25 per kg and what is more important to note is that the demand (of carpet wool) has not been rising. On the other hand, the meat demand all over the country is on the rise. Meat is fetching a price ranging from Rs 40 per kg to Rs 50 per kg (Jain, 1999).

The sheep breeders are at a loss in selling their produce of carpet wool due to the excessive involvement of the middlemen. The prices paid to them are much low and the situation could not be remedied as they are spread over throughout Rajasthan. "We have tried in the past to enable the breeders get a better price but things failed to come up to our expectations" said a senior government official (Jain, 1999). The sale of wool during migration must be coordinated with the shearing since carrying the wool is burdensome. The camp leader coordinates the major tasks associated with the sale of wool. He establishes contacts with the shearers, negotiates a selling price with wool merchants, and selects a site for shearing. He often contacts wool merchants even before the shearing has been arranged (Agrawal, 1999).

#### 5.8.3. Meat

Far out the biggest share of income is generated by the selling of male lambs.

Male lambs are sold at an age varying from 3 months to up to 12 months (5-6 months is most common), fetching prices from Rs 100 to Rs 700. Generally these lambs are kept at home and stall fed unto an age of 5 months, then they are either sold to the local slaughter house or taken with for grazing until they are sold. In times of fodder deficiency or high disease pressure lambs are sold at an young age (3-4 months). Prices depend on weight and body condition of the lambs. Mostly Raika men but also women negotiate with the slaughterer on the most appropriate price of their lambs. The following price classification can be made differentiating between qualities, see table 5.2. (source; butcher at local slaughter house in Sadri). Qualities of slaughter lambs seem to depend more on the quantity and quality of the



fodder intake during "fattening" then whether or not the lambs are of a specific meat producing breed, but not enough data was available on this. In good years when lambs can be well fed it might be that the breed of a lamb does influence the quality and thus the price the people get for their lambs. During migration the sheep are sold to Muslim traders who visit the camps at a regular times.

Table 5.2.	Classification	and	price	of	mutton
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QUALITY	PRICE CLASSIFICATION
Poor (3-4 kg)	Rs 100- Rs 300
Medium (5 kg)	Rs 400-Rs 500
Good (6-8 kg)	Rs 600- Rs 700

### 5.8.4. Dung

Income generated from the sale of sheep dung is highly variable, accounting from 7% to 33% of the total income (see Appendix F). Dung is sold per tractor trolley, fetching an average price of Rs. 800 per trolley. It was roughly estimated that one trolley contains about 400 to 800 kg of dung. If sold by the kg. dung fetches a price between Rs. 0.5 to Rs.1. Raika women are responsible for cleaning the corrals, collecting the dung and selling it to farmers. Sometimes it is traded for wheat, 80 kg of wheat is traded for 1 trolley load of dung.

From ten families sufficient financial data was gathered to roughly estimate their yearly income, see Appendix F. The data of this research have been compared with data from a household survey in Patawal village in Jodhpur district in1989-1990 by Agrawal (1999). In table 5.3. total revenues per sheep were calculated for both studies and converted to US\$ to be able to compare the data (the Indian rupee at the time of this research was about half the value of that of the rupee in 1990). The average annual revenue per sheep in Patawal village in 1989-1990 was US\$ 2.05 and that of Godwar area was US\$ 2.56. Compared to the figures found by Agrawal ten years ago the present average revenue per sheep is 25% higher, this increase however should be set of against an increase in prices of medicine and grazing fees.

Flock	1989-1990 Patal village, Jodhpur district		t 2001, Godwar area	
Number	Flock size	Revenue per sheep*	Flock size	Revenue per sheep**
1	95	1.54	60	1.65
2	107	2.82	60	3.65
3	110	1.12	60	2.86
4	148	1.94	150	2.04
5	212	2.88	200	2.06
6	228	2.37	200	2.58
7	255	2.07	100	3.33

Table 5.3: Comparison of revenue per sheep In Jodhpur district and Godwar area.



8	330	2.16	100	2.00
9	350	2.40	50	3.39
10	380	1.15	140	2.08

\*exchange rate of 1990 could not be found, therefore the rate was extrapolated from exchange rates in other years and was set at 0.042 Indian Rupee per US\$

\*\* exchange rate of March 2001 was 0.021 Indian Rupee per US\$

The most important requirement for the survival of the enterprise –grazing for the sheep- is usually free. But shepherds incur unavoidable expenses on medicines, shearing, pay labor, and sometimes grazing (Agrawal, 1999). However in Godwar area grazing grounds are becoming scarce and higher costs are incurred nowadays on paying grazing fees to the Forest Department. In fact when asked to rank the input expenses from highest costs to lowest cost respondents would unanimously rank grazing costs to be the highest followed by sale of medicines and shearing.

A number of factors influence the returns from sheep rearing. Those that the individual shepherd can control- at least to some extent- are the direction of migration (if the herd is taken on migration); the size, and age and sex composition of the flock; the timing of sheep shearing and wool sale, and the sale of animals (Agrawal, 1992). On the other hand, there are factors over which the shepherd has little control or no control; for example, the duration and severity of a drought; the availability of water and fodder; availability of medicines; outbreak of diseases; government policies; and the prices of wool and animals.

#### 5.9. Women in livestock production

### 5.9.1. Introduction

There is a lack of recognition of women's contribution to livestock production. There are several underlying reasons for this. These reasons mainly have to do with the fact that western donor-agencies and planners have been making (wrong) assumptions about rural women's place in non-industrialized countries. These misconceptions can be traced back to the colonial period (Bryceson, 1999). The model for India's earliest programs for agricultural development was the United States Agricultural Service. The heart of the agricultural program was to persuade farmers to shift from subsistence to capitalist methods of agricultural production. In brief, this program targeted men as farmers and women as housewives, thereby imposing urban middle-class gender norms on rural families. The Indian government adopted this model of development that failed to address the problems which the majority of rural women faced in their daily routines.

One of the primary shortcomings of this model is that the household was used as the unit of analysis and planning. The household approach to planning is based on the assumption that



women's reproductive labor complements men's productive labor to create a unified household set of values (Ramamuthy 1991). This approach obscures the fact that members of the household may have different needs, interests, and responsibilities.

While it is true that in many parts of the world women are engaged in the preparation of food, the picture of "the home shared by a man and a women, into which the men bring the food and women prepare it" is far from complete. The division of labor between man and women differs all over the world. It appears that forty years ago female farming (food production with little or no help from men) predominated in the whole of the Congo region, in large parts of South East and East Africa and in parts of West Africa (Bryceson 1999). Also in many Latin-American countries such as Peru, Bolivia and Guatemala women are engaged in sheep and llama production. In Chiapas, Mexico, tzotzil women are solely engaged in sheep husbandry, producing subsistence crops, collecting medicinal plants for their family and sheep and take care of their children while most of the men are working outside the villages. So the confinement of women to the domestic sphere only would be to neglect their knowledge, needs and interests in other sectors such as livestock production. It has led to a disregard for women's productive activities as farmers, irrigators and livestock breeders and has led to the assumption that they as individuals do not need access and control to and over resources, since they will indirectly benefit from their husband's rights and access.

It is only since the last 10-15 years that the critical role of women in livestock is getting recognition. It is now well accepted that most of the critical activities like cleaning, feeding, milking and more importantly care of new born and sick animals is mainly carried out by women. However there are variations in the extent to which the work is shared by men (Rangnekar, 1998). "Rural women are involved more in the animal husbandry sector than men. Studies indicate that women spend 1460 hours per year in animal husbandry which is 16.66% of their lifetime as compared to men who work for 500 hours which is 6 % of their lifetime" (Tripathi, 1998 p114). It was not clear however on which areas these figures were based and of course the extent of involvement of men and women varies between areas, regions and socio-economic groups.

A research on gender-based ethnoveterinary knowledge and labor division among Koochi Afghan nomads by Diane Davis revealed some interesting things especially given the fact that much of what has been written about the Koochi, as about many pastoral nomadic societies in the Middle East, stresses that the role of women is confined to household duties such as cooking, washing, sewing, and making and breaking camp. Their role with respect to the animals is usually described solely in terms of milking the livestock, processing milk products, spinning, weaving, and felting the fleeces (Davis, 1995). The research revealed that responsibilities included milking, caring for sick and newborn animals, and cleaning the internal organs of slaughtered livestock. Because women spend more time in close contact



with sick and newborn animals, and are also responsible for cleaning the innards of slaughtered livestock the women appear to be more knowledgeable than the men in areas such as the ability to recognize mastitis, and the care of newborns. The women also seemed to have more in-depth understanding of the relationship between parasites, symptoms and disease. It is significant that the response of the vast majority of men (94%) was that women do not know anything about animals that men do not know as well. This is not corroborated by the results of the quiz. Several authors (e.g. Davis, 1995 and Fernandez 1998) indicate that areas of livestock expertise are closely correlated with the areas for which women have most responsibility. Therefor there is enough reason to believe that this also applies to the Raika women. And although not enough data could be gathered on their eyhnoveterinary knowledge, their responsibilities relating to sheephusbandry may also indicate their area of expertise in animal health. The results of this research show that although herding is mostly done by men and/or male relatives, Raika women have responsibilities in many other significant areas. In addition to processing milk products, the women care for newborn and young animals, which are kept in corrals near the house until they are old enough to go to pasture with the herd. The women care for the animals that are ill, and these too are kept at the home. But what should be kept in mind is that the labor division as presented in the next paragraph is the result of interviews with 52 men and only 7 women. What was striking is that female respondents have very different perceptions regarding labor division and especially their contribution seems an underestimated aspect when only taken into account men's perception, this will be discussed in paragraph 5.9.3.

### 5.9.2. Gender-based labor division of Raika sheep patoralists

Women have shared responsibility of herding in 13% of all households whereas men are involved in 100% of all households (87% sole responsibility and 13% shared responsibility), see table 5.4.

RESPONSIBILITY	Ν	%
Men	33	61.1
Male relatives (brother and/or father)	11	20.4
Women/men (equally shared responsibility)	6	11.1
Men/male relatives	2	3.7
Men/son	1	1.9
Men/daughter	1	1.9

Table	5.4.	Herding	(n=54)
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Men are involved in feeding, meaning cutting fodder trees and feeding it to the animals in 80% of all households (71% sole responsibility and 9% shared responsibility) whereas women are involved in 29% of all households of which 20% has sole responsibility, (table 5.5.)

RESPONSIBILITY	Ν	%
Men	23	51.1
Women	7	15.6
Son	4	8.9
Male relatives	3	6.7
Women/men	3	6.7
Daughter	1	2.2
Whole family	1	2.2
Female relatives	1	2.2
Men/son	1	2.2
Men/hired labour	1	2.2

Table 5.5. Feeding; cutting fodder for stall feeding (n=45)

In 58% of all households interviewed men are involved in milking. In 50% of all households women are involved of which 42% of the women has sole responsibility for milking and 8% has a shared responsibility. From next table it can be observed that men are even more involved in milking then women which is quite surprising since many authors indicate that milking is a typically women's area of responsibility.

Table	<b>5.6</b> .	Milking	(n=50)
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RESPONSIBILITY	Ν	%
Men	20	40
Women	19	38
Women/men	4	8
Male relatives	2	4
Female relatives	2	4
Son	2	4
Men/son	1	2

Women have main responsibility in the processing of milk. In 91% of all households they are involved in the processing of milk (83% sole responsibility and 8% shared responsibility with other household members). Men are involved in processing milk (making ghee and buttermilk) in 17% of all households (8.5% sole responsibility and 8.5% shared responsibility). This figure is also surprising since generally the processing of milk –even more then milking- is seen as a typically women's job according to literature.



RESPONSIBILITY	Ν	%
Women	35	74.5
Men	3	6.4
Women/men	3	6.4
Female relatives	3	6.4
Women/female relatives	1	2.1
Women/son	1	2.1
Male relatives	1	2.1

#### Table 5.7. Handling milk products (n=47)

As can be seen from the low respondent rate (n=20) in table 5.8. ewes are not given assistance very often during labor. Often it is not necessary to help an ewe with lamming. In 20 households people keep an eye on ewes in labor and give assistance when necessary, this is done by men in most households, (70% have sole responsibility, 85% have shared responsibility). In the other 30% of all households other family members are responsible or share responsibility. Women are involved in 30% of all households of which 15% have sole responsibility and the other 15% shares her responsibility with other household members.

Table 5.8. Assisting ewes in lambing (n=20)

RESPONSIBILITY	Ν	%
Men	11	55
Women	3	15
Women/men	2	10
Son	2	10
Whole family	1	5
Hired labour	1	5

Women are mostly engaged in caring for the newborn, see table 5.9., in 89% of all households they are involved, in 82% of all households they have sole responsibility and in 7% of all households they share their responsibility with other household members, mostly with their daughter and other female relatives.

Table 5.9. Care for newborn lambs (n=54)

RESPONSIBILITY	Ν	%
Women	37	68.5
Men	5	9.3
Daughter	4	7.4
Female relatives	3	5.6
Whole family	2	3.7
Women/men	1	1.9
Women/female relatives	1	1.9
Son	1	1.9



Women have either sole responsibility or share their responsibility of caring for sick sheep in 53% of all households. Men are involved in 83% of all households, this also include hired labor, son and male relatives. However, what became evident during the research was that "taking care of sick sheep" was sometimes perceived as looking after sick sheep, feeding it and observing it and others perceived it as giving actual treatment with antibiotics, medicinal plants or other ailments. The question was not formulated clear enough and therefor the results as presented in table 5.10 only give a very rough idea of the involvement of family members in the "care of sick sheep" (thus including looking after and actual treatment). Table 5.10. Care for sick sheep (n=53)

RESPONSIBILITY	Ν	%	
Women/men	18	34	
Men	18	34	
Women	7	13.2	
Male relatives	2	3.8	
Hired labor	2	3.8	
Son	2	3.8	
Men/son	1	1.9	
Men/son, daughter	1	1.9	
Female relatives	1	1.9	
Daughter	1	1.9	

Generally women and children look after sick animals which are kept near the home. Actual treatment of sick sheep with antibiotics is done by men, whereas the responsibility of making home-remedies such as teas and oil and turmeric and the administering of these remedies seems to be shared equally among family members. There are big differences between households in the extend of involvement in taking care and treating sick sheep. There were households in which women only took responsibility in milking and making butter milk and there were families were the men's only responsibility was that of herding and even in this activity his wife was equally involved.

As for the treatment of sick sheep outside the family context, it seems that only men are involved, either governmental veterinarians, traditional healers, spirit mediums or firing healers, all were men (see paragraph 5.10). However within the village context informal networks exist of women who teach other women how to make home remedies and treat sick sheep. Ambu from Mundara village learned about sheep healthcare from her father and mother when she was a little girl, she used to have sheep but now she is 80 years old and a few years ago all the sheep of her family were either sold or given away, however she is now teaching other women of her village, about sheep diseases, how to treat sick sheep and how to make home remedies.



From these results it can be concluded that women's main responsibilities are those of taking care of new born animals and young animals and handling milk. Milking and the care of sick sheep is also taken up by women in a considerable large percentage of households. Raika men have main responsibility in herding, feeding (cutting trees) and assisting ewes in labor and to a lesser extent taking care of sick sheep. Milking is more or less equally divided between men and women.

#### 5.9.3. Perceptions of labor division

When the data presented in paragraph 5.9.2 is split up in information given by men and information given by women it becomes clear that men and women have different perceptions of what they and especially what others (their wives, husbands or family members) contribute in terms of labour. This became clear when the information of the female respondents was compared to those of the men.

Three (50%) out of the six Raika women interviewed claimed to share equal responsibility in herding whereas only 8 Raika men (8%) acknowledged that women contribute to herding. Ambu, an 80 year old Raika women from Mundara village said that in her village it is very common for women to go herding and she claimed to know at least 10 women who go herding regularly. Four (67%) of the women claimed to be solely responsible for milking and one (17%) shares the responsibility with her husband comparing this with the information given by the men; in 34% of households women are solely responsible and 7% share their responsibility. Five out of six (83%) women state that taking care of new born animals is done either by themselves, by their daughter or other female relatives, this is exactly the percentage given by the male respondents, 40 out of 48 (83%) male respondents states that the caring of new born is done by women.

The most striking difference in opinion/perception between men and women was seen in that of taking care of sick animals, it should be mentioned however that this could also be partly the result of the wording of the question as discussed in paragraph 5.9.2.. Five out of six women (83%) claimed that taking care of sick animals was basically their responsibility, one women said that she shares the responsibility with her husband and other family members. Whereas only 4 men (9%) out of 47 said that women are responsible for taking care of sick sheep.

Although only six women were asked about the labor division in their household which is to little to draw conclusions on, their perceptions do confirm what was already suspected (through literature; Rangnekar, 1998, Davis, 1995; observation and key informants; Hanwant Singh Rathore, director LPPS), and that is that women contribute more labor in all livestock related tasks then their male household members –and others- realise.

