Chapter 6

Agriculture, Pastoralism and Household Economy

Introduction

Vincze (1980) has discussed the features of economies which he refers to as 'agro-pastoral peasant economies'. The term can usefully be applied to the economy of Hinganiya and its surrounding villages. It is a peasant economy in the sense that it is concerned with subsistence, while being oriented towards markets for the sale of surpluses. It is agro-pastoral because the economy combines agriculture and herding.

This chapter describes agricultural and pastoral production in Hinganiya. It then goes on to describe subsistence activities, placing emphasis on the annual work cycles associated with both agriculture and pastoralism. A major aim is to identify priorities for production and any points of conflict between the requirements of the various subsistence activities.

It is important to emphasise that the production of both agricultural and pastoral products is aimed primarily at subsistence and, only secondarily, at cash income.

Agricultural and Pastoral Production

(a) Agricultural Products

The main crop grown is *bajra* (pearl millet). Bread made from millet is the staple of village diet in much of western Rajasthan. The 1981 Census of India names millet and wheat as the staples of all four villages in the cluster (Census of India 1981a), but this is simply incorrect. Wheat is only occasionally eaten and is regarded as something of a luxury. Wealthier families provide chapatis made of wheat to honoured guests, but, even given the high prestige value of wheat, some individuals express a personal preference for *hogra* (chapatis made of millet). I believe this is a genuine preference, not one motivated by any defensiveness about the fact that wheat is rarely available. Wheat is provided by the government at rationed prices in famine periods, but this hardly makes it a staple.

Other major crops are the pulses *moth* and *moong*, both sources of lentils used for making *dal* and *jowar* (sorghum) which is a secondary grain crop for human consumption. *Guar* (cluster bean) is used as fodder. The stalks from millet and sorghum are stored for dry season fodder. Vegetables are grown on a few irrigated plots in Kur, but as there is no irrigation in any of the other villages, most vegetables in the diet are from further afield. Sometimes vegetables are available in the shops in Kur or Kukunda. Malis (gardeners) from other irrigated villages frequently pass through Hinganiya selling vegetables from camel or bullock carts. (Table 6.1 summarises crops grown in Hinganiya and identifies them by botanical names.)

Table 6.1

Major crops grown in Hinganiya

Common Name	Local Name	Botanical Name	Use
pearl millet	bajra	*Pennisetum typhoides*	staple cereal
sorghum	jowar	*Ardropogen sorghum*	secondary cereal
moth bean	moth	*Phaseolus aconitifolius*	vegetable (dal)
moong bean	moong	*Phaseolus aureus*	vegetable (dal)
cluster bean	guar	*Cyamopsis psoralioides*	fodder & vegetable

Note: Botanical names taken from Jodha and Vyas, 1969

The first use of all locally grown crops is subsistence. Surpluses are sold as cash crops in Jodhpur and Pipar City. Occasionally bags of surplus millet may be exchanged directly (one for one by weight) for bags of wheat from wheat producing villages.

Bajra is by far the most important crop. It is favoured by farmers because it is highly drought-resistant. High yielding varieties (HYVs) have been introduced, although adoption has been relatively limited (see later discussion). *Bajra* is sometimes grown on its own, and sometimes intercropped, particularly with *moth*.

It is a monsoon crop, planted as soon as the rains commence. Productivity varies immensely, depending on the success or failure of the monsoons and on the quality of land. Local estimates for production from one bigha vary from 100 to 300 kg for a good year, although the upper

figure almost certainly refers to HYVs. In 1983, I recorded production for sown areas as reported by two farmers, giving averages of 172 kg/bigha and 162 kg/bigha. 1983 was an exceptionally good year, so the yields were atypical. Nevertheless, these figures suggest a higher level of productivity than usually reported. Bapna (1976) gives the hectare yield for Jodhpur District as 166 kg, which translates to 25.56 kg/bigha. This, however, is an average figure, apparently covering a twenty year period (this is not absolutely clear) and also covering production from all land in the district, including the worst as well as the best land. The coefficient of variability of production reported by Bapna was 82.5%, indicating a very high range of variation from the average. Sardar Singh (1896), referring to Marwar, says that the average yield is two maunds (about 75 kg) per bigha, a figure which matches a rough estimate by Jodha (pers. comm.).

Given that the figures that I recorded refer to a good year, and given that the majority of land in Hinganiya is classified in the higher quality categories of unirrigated land (Hinganiya is in the relatively fertile eastern half of Jodhpur District), and given that informants consistently estimated yields in the order of 150-200 kg per bigha, I am inclined to accept that a figure somewhere between 100 and 150 kg per bigha is a reasonable outcome for good land during a good year, although higher figures are certainly possible in some circumstances. This translates to 625 to 940 kg per hectare.

To put this into perspective, there were eight years of declared famine in the ten year period 1978-1987 in Hinganiya and its environs. There was one good year (1983) and one year regarded by farmers as satisfactory (1984). In 1985 local estimates of production were in the order of 30% of good year production. In 1987, production was negligible. As an order of magnitude guess, something like a 20-30% average over the ten year period is probably realistic, given the number of drought years, the fact that 1985 was not a particularly bad drought and the fact that fields are either fallow, or not planted with *bajra* in some years. This amounts to 30-45 kg per bigha per year (about 187-280 kg per hectare per year). This is slightly above the Jodhpur District average mentioned above and therefore is consistent with the slightly better average quality of land in the eastern parts of the district.

Productivity for high yielding varieties (HYVs) is usually reported as being about double that of ordinary *desi* (local) seed. I will discuss HYVs later in this chapter.

Market prices for *bajra* in Jodhpur vary immensely, depending on availability. For example, in December 1983, after most of the good harvest had been collected, the price was Rs 1-50 per kg. Informants estimated that it would rise to Rs 2 per kg a few months later. In the midst of the drought of late 1985 it was Rs 2-50 per kg.

Because other crops are usually grown in intercropped fields, productivity is not easy to estimate accurately. In an experimental treatment in which *moong* and *guar* were used as controls, Shankarnarayan *et al.* (1987) give per/ha yield for *moong* as 640 kg/ha and for *guar* as 320 kg/ha. These figures refer to 1983, and thus refer to the same good season as my figures for *bajra*. The figure for *guar* is consistent with reported output for a four bigha plot of *guar* in Hinganiya for the same year. Reported production was 200 kg, which converts to 312.5 kg/ha.

(b) Livestock Production

Livestock production involves a variety of species. Domestic animals raised in the region are camels, cattle, buffalo, sheep and goats.

All the cattle in the district are of the humped Brahman variety (*Bos indicus*). Cows are highly valued for milk, both for domestic consumption and for sale in Jodhpur. At the time of my fieldwork few milk producers in Hinganiya itself owned enough cattle to become substantially involved in the sale of surplus milk. However, small amounts of milk surplus to household requirements (as little as a litre at a time), were sometimes taken to Kukunda and sold to middlemen who, in turn, transported it to urban outlets.

Bullocks are used as work animals, either for pulling carts or for ploughing. Bulls are of no economic value apart from breeding, and are occasionally seen wandering wild. In fact very few bulls or bullocks are found in the area. Most young males are castrated and bullocks are often sold because they are of relatively limited value in an area where there is only one agricultural season and where there is a proportionately small need for ploughing. Camels are preferred as work animals because they can haul bigger loads by cart and can also haul ploughs. Unlike ploughing, cart transportation has year round application.

In 1985/6 I carried out a livestock survey, obtaining data for animals owned by all households. Of 125 adult cattle, 116 were cows, two were bulls and there were seven bullocks. Table 6.2 sets out the figures for all cattle, by sex and age category.

Surplus bulls and bullocks are often sold at cattle fairs (such as the Pushkar Mela or the Jajiwal Mela). Buyers tend to come from areas (in other states, or in eastern Rajasthan) where plough animals are of greater use. This, essentially, means areas where two crops (the winter or *rabi*

and the summer/monsoonal *kharif*) are grown each year.[1]

Buffalo are highly valued as milk animals. Apart from breeding, male buffalo have no economic value. Table 6.3 gives the sex/age breakdown of buffalo in Hinganiya.

Table 6.2

Cattle in Hinganiya 1985/6, by sex and age category

Adult Male	2		
Adult Female	116		
Bullock	7	Total Adult	125
Young Male	39		
Young Female	60	Total Young	99

Table 6.3

Buffalo in Hinganiya 1985/6, by sex and age category

Adult Male	1		
Adult Female	12	Total Adult	13
Young Male	8		
Young Female	6	Total Young	14

Table 6.4

Camels in Hinganiya 1985/6, by sex and age category

Adult Male	4		
Adult Female	21	Total Adult	25
Young Male	4		
Young Female	6	Total Young	10

Note: 'Young' refers to cattle, buffalo and camels under three years old

[1] Lodrick (1984) argues that livestock markets in western Rajasthan act to circulate livestock out of the drought area in bad seasons and that they particularly remove zebu bulls and bullocks, but rarely milk producing females. Thus a situation *approaching* a desired balance is achieved within the strictures of the sacred cow complex. The ratios of male to female cattle in Hinganiya were explicitly explained to me by a villager with reference to the selling of bulls and bullocks to areas where they are needed for ploughing.

Male camels are used as work animals, usually for pulling carts or for ploughing. Female camels are sometimes used for lighter tasks, such as carrying water bags or for riding. Generally, in this region riding tends to be a supplementary use for camels kept primarily for other purposes. There is considerable income to be made in raising camels for sale. In Hinganiya, however, the only people who own more than one camel are Bishnois. Table 6.4 gives the numbers and age/sex breakdown of camels in Hinganiya.

Goats are raised both for their milk (for domestic consumption) and for sale as meat. Young male animals are sold to travelling buyers who then sell them in cities such as Jodhpur. Most people in the village are non-vegetarian, but this is a statement of their willingness to eat meat rather than of common practice. Animals are rarely butchered for domestic consumption. The only meat I saw in Hinganiya was deer meat (obtained by hunting) or mutton (goat meat) purchased in Jodhpur. The reluctance to slaughter animals in the village clearly relates to their cash value - about 150 to 200 rupees for sheep or goats.

Table 6.5

Goats in Hinganiya 1985/6, by sex and age category

Adult Male	17		
Adult Female	261	Total Adult	278
Young Male	42		
Young Female	55		
Young Unspecified	41	Total Young	138

Table 6.6

Sheep in Hinganiya 1985/6, by sex and age category

Adult Male	14		
Adult Female	226	Total Adult	240
Young Male	5		
Young Female	10		
Young Unspecified	85	Total Young	100

Note: 'Young' refers to kids and lambs under one year old

Sheep are raised almost entirely for commercial purposes - for wool and (less often) for meat. They are occasionally milked for household consumption. Tables 6.5 and 6.6 give the age and sex distribution for goats and sheep respectively. I have included the figures for young animals (animals under a year old), but must stress that these figures are not very useful for several reasons. Firstly, informants did not always know the sex ratios of the 'young' components of their flocks. Secondly, the numbers were sometimes approximate. Thirdly, the survey took several weeks to complete. During this period a number of animals were sold to butchers and new births were occurring all the time.

It is useful to compare the patterns of ownership of sheep and goats. The survey of 1985/6 reported a total of 278 adult goats and 240 adult sheep. Forty-one households owned goats making an average of 6.8 per goat owning household. Only fourteen households owned sheep, an average of 17.1 per sheep-owning household. In other words fewer people own sheep than goats, but those who own sheep tend to own more. This is because quite large numbers of sheep are required to justify involvement in production of wool, whereas even a small number of goats provides good returns, at least at a basic subsistence level. Wool production tends to be a specialist activity. This conclusion is supported by the fact that specialist sheep herders exist in the region, whereas there are no specialist goat herders.

The cash value of sheep and goats is important, although the two types of animals have a distinctly different economic role. One thing they have in common is a potentially prodigious rate of herd growth. Both sheep and goats breed twice in a year; multiple births are common. Dahl and Hjort (1976) have modelled, on a computer, the growth rate of flocks with average age and sex distribution, based on conditions in semi-arid parts of Africa. While, as Dahl and Hjort readily admit, models based on dubious assumptions about average conditions are suspect, they do suggest the order of magnitude of herd growth potential.

Regarding goats, Dahl and Hjort's figures show that flock size can increase between double and triple in three years, depending on basic flock age and sex structure. My own calculations reinforce this notion. Given a breeding population of ten female goats (and access to a male for breeding purposes), assuming a 75% fertility rate (and no multiple births), two breeding seasons would produce fifteen young animals per year. Of these an average of 7.5 would be male. Allowing a high rate of 33% mortality, five male kids would be available for sale. The base number of female stock would also increase by 7.5. Even allowing 40% overall female mortality, the base flock of ten females would be preserved. In other words a stable flock could be maintained and still produce males for culling each year equivalent to 50% of the number of breeding females.

Dahl and Hjort calculate that, if an entire population (adult male, adult female and young animals) is included, 32% of the *whole* flock can be culled each year. This is close to my figure which relates to 50% of the base breeding population.

All this assumes herd stability. In fact a lower female mortality rate means that herd size can increase while allowing culling to continue. As female numbers increase so does the annual number of young males available for culling. Of course, high mortality due to very serious drought or epidemic would invalidate the assumptions. Lower fertility during drought conditions is another factor which would act to reduce productivity. Nevertheless the argument demonstrates the high potential productivity of goat flocks.

These figures apply to goats, though similar arguments could be made for sheep. The other thing that applies in each case, is the importance of maintaining breeding stock so that the flock can reproduce itself rapidly. In Rajasthan the sale of young males of both species for meat is acceptable, but females of both species are not eaten or sold to butchers. This has a ritual aspect, but is also pragmatic.

The sale price of a six or seven month old goat was approximately Rs 150 at the time of my fieldwork. Even a small owner, with ten breeding goats could sell approximately five male kids in a year, at Rs 750. Even two or three goats are valuable, providing milk for domestic consumption and the odd male kid for sale.

The economics of sheep production is more complex. Male animals are sold for meat, rates being much the same as for goats. Sheep are usually shorn twice a year, the yield varying and the price per kilogram varying according to quality. The most highly regarded breed of sheep is the Bikaneri, producing 1-1.5 kg of wool per shearing, twice each year, around April and October. In 1985 each kilogram of Bikaneri wool was worth between Rs 15 and Rs 18. The three other important breeds (in decreasing order of desirability) each produce about one kilogram per shearing and are the Jaisalmeri (Rs 12-15 per kg), the Marwari (Rs 8 per kg) and the Mewari (Rs 6-8 per kg).

In a good year, a flock of fifty breeding Bikaneri sheep would earn up to Rs 1500 per year for wool, plus Rs 3750 for the sale of twenty-five male lambs at Rs 150 each. The total, less costs for medicines etc (sheep are very disease prone) represents a considerable income.[2] Nevertheless, sheep raising is risky. In 1985/86 the herds of two of the four sheep

[2] For a herd of 100 sheep, Salzman (1986) estimates an annual income of Rs 10-15000. His calculations include sale of milk products and dung. No one in Hinganiya counts his sheep in multiples of 100, but the estimate is comparable.

specialists in Hinganiya were decimated by disease. (This occurred after my livestock census.)

(c) Utilisation of Trees, Shrubs and Natural grasses

An essential aspect of both the ecology and economy is the role of trees, shrubs and natural grasses. All of these natural resources are used primarily for fodder (*chara*). Apart from natural grasses, small bushes are major sources of naturally growing fodder for grazing and browsing animals. In winter and summer, *shinnia*, a small bush sometimes woven into rope, is a major source of fodder for all types of livestock. *Shinnia* grows in the winter. *Bhivna*, a bush which grows in the monsoon, is eaten by sheep and goats. As it dries out the branches become a rich source of fuel which burns quickly and with great heat. It provides a major source of fuel during winter. In good seasons the growth of these and other bushes and grasses is prolific.

Several species of trees are valued by villagers. Of these the most significant are the *khejri* (*Prosopis cineria*) and the *ber* (*Zizyphus nummularia*). Both of these species are valuable fodder species and the *ber* also produces a popular fruit.[3] Quite apart from its fodder value, the *khejri* is considered to have beneficial effects on crop production, since it helps maintain soil moisture and soil conditions (Shankarnarayan *et al.* 1987).

There are a surprising number of trees in the vicinity of Hinganiya and Khokhariya in particular, although the whole region around Pipar (in eastern Jodhpur District) is generally fairly well wooded. In a rough experiment, I counted trees on a sample plot of farm land in Hinganiya and found twenty-three trees over shoulder height in an area I estimated to be about 1.25 ha. This amounts to a density of 18.4 shoulder height trees per hectare. While this was by no means a precise measurement,[4] it does indicate, as an order of magnitude, just how common trees are. The selected plot was fairly typical, in my subjective judgement, of the surrounding area.

Trees on farm-land are generally not planted, but result from natural regeneration. The fact that smaller trees are present indicates that they are protected to some extent from grazing animals, and pruning, while

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3 Bhandari (1977), who identifies twenty-three species of edible plants in the Rajasthan Desert, says that the leaves, shoots and even the bark of the *Khejri* are edible.

4 The survey was very 'unscientific', simply because it was done as something of an afterthought during my very short visit to Hinganiya in 1987. I had previously recognised the importance of trees, but had not thought to count them systematically. Seven months working on a forestry project in Nepal immediately prior to my visit had sharpened my recognition of the importance of trees.

severe, always leaves enough growth to enable regeneration. In addition to trees on farmland, trees on common land are protected from pruning by a prohibition backed by sanctions. I have seen no evidence of illicit pruning of such trees. Although I have not carried out any study to support this argument, I suspect that the common stereotype of the desert loosing tree cover at an astounding rate is not accurate, at least in this part of the Thar Desert. There is every sign that trees are valued and protected and the evidence of regeneration is a healthy sign.

Villagers also plant trees in the village, protecting them from goats with a cover of thorny bushes. Seedlings are available from the Central Arid Zone Research Institute in Jodhpur.

The Agricultural Cycle

I have already mentioned the monsoonal basis for the agricultural cycle. I will now expand this and then show some aspects of the relationships between agricultural and herding activities. It is essential to remember that annual work cycles vary according to the success or failure of the monsoon. Thus, the preliminary description is of an ideal situation, that is a year of good monsoon rain.

The wet season, when it comes, usually arrives in early to mid July and lasts until late August or early September. If the monsoon does occur, there is a season of agricultural activity lasting through the monsoon and into the winter. The final phase (threshing and winnowing) runs into early January in a good year.

Throughout the agricultural cycle priority is given to *bajra*. It is planted first and harvested when it is ready. Everything else fits around the *bajra* crop. Other crops are only planted after no essential tasks related to *bajra* are outstanding. The slightly longer period of growth for other crops (*bajra* only takes about seventy days) allows them to be planted after *bajra* and to be left until the essential work related to *bajra* is completed. This is fortuitous, since it minimises competing priorities, but it should not be allowed to obscure the priority. If the rains fail later during the monsoon, then the other crops are expendable, but *bajra*, as the staple, is not. Thus, the reason for the order of planting does not relate to later conditions being better for other crops, but to the need to minimise risks to the staple crop.

The agricultural year can be divided into a number of stages.

(a) Ploughing and Planting

Ploughing and planting usually take place in July. The actual timing depends on whether rain has fallen. Planting does not take place until after the first rain has fallen. Similarly, there is normally no ploughing

unless some rain has fallen. Once the first rain falls the fields are ploughed and seed is sown.

At the beginning of the monsoon farmers make an assessment of the probability of good rain. During the 1985 season the monsoon came slightly late, some good rain followed and then the monsoon petered out, virtually no rain falling in the latter part of the monsoon. From my arrival in mid-August there was no rain in Hinganiya (apart from mild sprinkling) until early October, by which time the poor harvest had already been brought in. One Nayak had only sowed half of his meagre fields, despite the fact that his landholding was barely adequate to provide a year's supply of *bajra* for his family, even in a good year. He told me he had done this because the early rains were very poor. Apparently he was confident enough of his forecast to not risk wasting the effort required to sow all of his land. He may also have decided to make the best of a bad situation by leaving the land fallow.

Ploughing is done either by use of bullock or camel-drawn ploughs, or occasionally by tractors. Those farmers who do not own camels or bullocks have to hire or borrow them, or they may hire a tractor. For *bajra*, the land is ploughed only once. For other crops it is ploughed about three times.

Sowing is done by means of a funnel-shaped tube (*bijni*), or a pair of such tubes, attached to a single or double pronged plough. For local varieties of *bajra* approximately one kilogram of seed is required per bigha. Normally the seed is simply left over from the previous year. HYV seeds are purchased.

Mixed cropping, intercropping, fallowing and alternating crops are important aspects of the agricultural cycle. I have already pointed out that the first priority in agriculture is guaranteeing, as far as possible, the production of the staple crop. Within this context the production of secondary crops, including cash crops, is pursued enthusiastically. Generally speaking, poorer farmers rarely devote significant proportions of their land to crops other than *bajra*, although they often favour mixed cropping of other crops with *bajra*. Larger farmers, or those with alternative sources of income, may devote considerable areas to other crops.

Farmers recognise the value of leaving fields fallow, but the opportunity to do so is obviously greater in the case of farmers owning relatively large amounts of land. Among the cases of sharecropping arrangements I recorded are two cases of farmers using someone else's land on a sharecropping basis and leaving their own land fallow ('for the goats').

Overall, fallow fields comprise only a small proportion of total cultivable fields. According to Jodha (1977), more than 80% of private holdings 'in most districts' were actually cultivated in 1970-71. This is consistent with my experience.

The disadvantageous effects of poor farmers having to plant wherever possible are probably reduced to some extent by enforced fallow periods during drought. This factor, plus the unpredictability it involves make me very dubious of attempts to describe crop rotation patterns as if they were regular cycles. Agarwal (1979), for example, lists common cycles for unirrigated land, such as *bajra*-fallow-wheat and *bajra*-fallow-*moong*-fallow. Nothing works that regularly.

The value of alternating *bajra* with pulses is recognised, but circumstances do not always permit this. Again, larger farmers have the advantage. Mixed cropping and intercropping are ways of obtaining some of the benefits of alternating crops.[5] As some crops do not compete it may be possible to maximise production of both. Intercropping of *moth* or *moong* or *guar* and *moth* is quite common. Intercropping *bajra* and pulses is reported as being common (Agarwal 1979), and I have seen *bajra-moth*-oilseed and *bajra-moth-jowar* combinations. Although intercropping does occur it is often the case that, where *bajra* is grown in the same field as pulses, the pulses tend to be kept in a separate section of the field. This is not intercropping in the normal sense. A field, however legally registered, may be sub-divided amongst several owners, so there is nothing surprising about having different crops, or combinations of crops, in different sections.

(b) Hoeing and Weeding

Throughout the period of crop growth there is a fairly heavy and consistent work-load involved in hoeing and weeding, particularly of fields of *moth* and *moong*. While this work is sometimes carried out on the level of the individual household, it is often a large chore and many farmers, especially those with bigger holdings, hire labour to do the task. The work groups are sometimes quite large (ten or twelve are common) and are of mixed caste and sex. There are two qualifications regarding the mixed nature of the groups. Firstly, while married women of other castes often work, it is unusual for married Rajput women to work in such groups. Unmarried Rajput women will do so. Secondly, while Rajput men will work side by side with men of other castes, in practice this usually occurs only in fields owned by Rajputs. The fact that Rajputs

5 Mixed cropping involves growing two or more crops on the same field or part of a field at the same time. Intercropping is defined by Ruthenberg (1980) as a system in which 'two or more crops. . . are grown on different but proximate rows' (p.133).

rarely work for Nayaks or Meghwals probably reflects the fact that members of these castes, having small amounts of land, do not require very large work groups. The prestige of working for, as opposed to with, other castes, may also be a factor. Thirdly, Bishnois do not often work in work groups for other castes. Work-groups on Bishnoi fields tend to be made up largely, but not exclusively, of Bishnois.

The work groups operate in lines, which work their way up and down the fields. Men and women work in separate lines, but there is no caste segregation within the male and female sub-groups.

Some farmers prefer to do the hoeing themselves. In such cases it tends to be a regular chore. I timed a working party of twelve people hoeing an eight bigha plot of *moth*. They completed the job in somewhat less than a single eight hour day. For a single farmer to do the same task would, presumably, have taken about ten days.

(c) Harvesting

The first crop harvested by any particular farmer is usually *bajra*, although the harvesting of various crops does overlap, in that some large *bajra* crops are still being harvested after other farmers have completed their *bajra* harvest and moved on to other crops. If the monsoon is good, harvesting can take several months. It is usually finished by the end of November. In 1983 the *bajra* harvest began in early September and was nearly finished by the end of that month. Other crops were still being harvested into December. In 1985, which was a poor year, virtually all crops of all species were harvested before late September.

Bajra is harvested with the use of a small hand held knife with a curved blade (*dantla*). The stem is cut just below the head. The worker wears a piece of cloth folded and tied so that it hangs as a bag around his or her back. The heads of the *bajra* are placed in the bag until it is full. It is then emptied onto a blanket placed on a cleared patch of sand near the section of the field being worked. When the pile of heads on the blanket is large enough, the four corners of the blanket are tied together and it is lifted onto the head of one of the male workers. He then carries it to a central cleared area and empties it onto the sand. Later the pile is covered with *bajra* stalks to protect it from birds (mainly pigeons and the ever-present peacocks).

Work groups are sometimes limited to the field-owner's household. On other occasions hired agricultural labour is used. Composition of work groups follows the pattern described for hoeing/weeding parties. Some specialization occurs, two or three men being responsible for carrying the blanket, sweeping up loose grain detached while the *bajra* is being transported and gathering stalks to ensure protection of the harvested grain. Where the field owner is a Rajput he usually co-ordinates

this activity and also prepares tea and ensures that a steady supply of drinking water is available. Food for the workers is usually prepared by the women of the household and carried to the field from the village. I have not observed the arrangements made for food for clean caste people working in fields for people from unclean castes because, as I pointed out above, this rarely occurs. In other non-agricultural situations (such as the making of mud-bricks), Rajputs working for Nayaks or Meghwals prepare their own food.

Where the owner of a field owns several dispersed fields, the harvest from each is later transferred to a single cleared area which will be used as a threshing floor. (This is done after the harvest of a particular field is completed or, after the entire *bajra* harvest is completed.) *Bajra* is carried to the threshing floor by camel or bullock cart (usually hired, because few people own carts).

A great deal of care is taken at all stages of the harvest, including transporting the crop, to sweep up loose grains of *bajra* and to ensure that nothing is lost.

Harvesting *jowar* is a similar process, although the quantities grown are much less and large working parties are not necessary.

Once a land-owner has harvested his *bajra*, the other crops are harvested, if ready. In the case of *moth* there is a fairly brief optimum period for harvest and large amounts of labour are necessary to bring in the harvest quickly. A common method of obtaining this labour is to hold an *adola*. Unlike other types of agricultural working parties, there is no cash payment for working at an *adola*. The owner provides tea, *bidis* (local cigarettes) and a meal. In return, depending on the prestige of the person who holds the *adola*, people may come from miles around to participate.

The work of harvesting *moth* is extremely arduous and unpleasant. The men (only men participate in the actual harvest in this case) squat on their heels and pull up the plants (small thorny bushes up to about fifty centimetres high) by the roots. Working in a line, the workers, each waddling rather like a duck, move up and down the field still on their heels. This action is very uncomfortable and the small thorns at the base of the plant make the whole process quite unpleasant.

Despite this the whole atmosphere of an *adola* tends to be festive. While the work proceeds a chant inevitably starts up. This chant consists of endless repetitions of a single line: *'O bolo bayi Ram hey ho'* (O speak brother god). It was the only line I ever heard chanted on these occasions.

The exuberance which characterises attendance at an *adola* was typified by the behaviour at the first *adola* I ever attended. It was held by Gooman Singh, a highly respected Rajput from a nearby village. I

counted about fifty people at this *adola* (the continual coming and going makes it difficult to keep an accurate count), including people from several nearby villages and Rajputs, Nayaks and Meghwals from Hinganiya. In addition there was the usual party of women from Gooman Singh's household preparing food and tea in a field adjoining the field where the work was going on. Harvesting started at about 11am. There were breaks for water and bidis, and sometimes for tea. The meal was served in the mid afternoon. It consisted of a dish made of *hogra* (millet chapatis), *gur* (molasses) and large quantities of *ghi*. The workers, eating from trays shared with caste fellows, ground up the *hogra* and mixed them with the other ingredients before eating. After this dish, which was regarded as a treat, *dal* and *haldi-subzee* (vegetable in tumeric) were brought. This menu was duplicated at every *adola* I attended and the expensive ingredients were a large part of the attractiveness of an *adola*.

In the late afternoon it became clear that a lot of work needed to be done quickly. Despite the heat and effects of a long day doing arduous work the villagers from Hinganiya accelerated and started to work at a furious pace, racing with the other groups in an extraordinary display of friendly competition. The work finished at about 6.30 pm, when it was quite dark.

Why do people attend an *adola*? Firstly, there is the fun aspect. *Adolas* only occur when good harvests of *moth* are to be had. In the excellent 1983 season they were held frequently. When the rains fail, as they did in 1985, *moth* is not likely to be a successful crop, and, in fact, there were no *adolas* in 1985. The coincidence of a well catered festive occasion with the general buoyancy of mood which goes with a year of generally good harvests seems to be a major reason for attending. Secondly, the food provided is generally lavish in terms of the value of food provided. On one occasion I attended an *adola* held by a poorer Rajput. He had purchased poor quality local *ghi*. One of the Meghwals who attended was very critical of this. At first he said the Rajput was a 'bad man'. He corrected himself saying that he was not really bad, 'just poor'. Clearly, however, there is a strong expectation that workers are to be rewarded with good food.

Other reasons for attending are related to reciprocity and respect for the holder. People express the view that reciprocal attendance is desirable, but an analysis of attendance does not strongly support this. Table 6.7 shows reciprocal attendance at five *adolas* held in November 1983. The table only refers to attendance by people who had held *adolas* themselves, not the many others who attended. All five people referred to in the table are Rajputs. My records are incomplete, but it is clear that simple reciprocity does not apply. Rajput E, for example, did not attend any of the other *adolas*, but other *adola* holders attended his. The fact that he had a serious operation several years ago might be seen as a

justification for his not doing too much heavy work, yet in other contexts, he did quite heavy work. Whatever the reasons for his non-attendance, he is held in great respect and his *adola* was attended by members of all castes.

Table 6.7

Reciprocal attendance at *adolas* 1983

	Holder of *adola*				
Attendance at *adola*	A	B	C	D	E
A	x	o	x	x	x
B	x	x	x	x	x
C	x	x	x	x	o
D	x	x	-	x	o
E	o	o	o	o	x

Key: x - present o - absent - not recorded

The prestige of the person giving an *adola* is obviously one reason for attendance. People tend to go to *adolas* held by people they respect, but failure to attend is not necessarily regarded as an insult. Sometimes people have other obligations (including urgent work in their own fields.

(d) Threshing and Winnowing

When the full harvest has been gathered threshing begins. *Bajra* is usually threshed first, but the process can be delayed if other crops are ready for harvest. I have already described how all of the crop is transferred to a threshing floor. Each household normally has a separate threshing floor. The pile of *bajra* heads is first levelled to cover the whole floor and then a crushing operation takes place. A tractor is hired to drive over the pile until the bigger pieces of *bajra* are broken up and the grain is loosened. Where a crop is small and/or the farmer is poor, the process can be carried out by bullocks walking repeatedly over the *bajra* to break it up. Occasionally the crushing is done by hand, using a *lathi* (a heavy wooden staff). Even poorer farmers sometimes hire a tractor, which does the entire task quickly and efficiently. The winnowing operation is carried out by household labour, sometimes supplemented by the use of one or two hired labourers.

(e) Harvesting and Gathering Fodder

A final stage in the harvest is the harvesting of the stalks of *bajra*, *jowar* and *guar* for use as fodder. Again larger fields are harvested by mixed (by caste and sex) work groups, often of paid labourers. The stalks are collected into bundles and stored for use as animal fodder in bad seasons, or as a dietary supplement at other times.

Previously harvested batches of *bajra* stalks are cut into chaff and stored. In late 1985, this was done with the use of a hired tractor with an attached chaff-cutter. The work requires several men to feed the stalks into the cutter (which works very quickly). The overall task takes only a short time even for people with large amounts of fodder to process and the labour (all male) is voluntary.

The timing of all these stages varies somewhat (within the general parameters of the monsoon period) according to the quality of the crop, the amount of land sowed, and the types of crops grown by a particular farmer. In 1985 the entire cycle was compressed due to the poor production. All harvesting was completed before the end of September and farmers estimated that only about twenty to thirty per cent of the desired *bajra* harvest was collected.

The late 1985 season was marked by quite intensive activity revolving around the gathering of fodder from non-crop sources. This emphasised the state of siege atmosphere resulting from the failure of the crops. The atmosphere was in marked contrast to the same period in 1983, when there was a feeling of satisfaction and optimism about the following year. In 1985 new components of agricultural work became prominent after the routine processing of fodder discussed above was completed. Faced with at least seven lean months before the next possibility of monsoon rain, villagers began to gather fodder (*chara*) from any possible source.

Following the routine harvesting of crop leftovers for fodder (routine but carried out comparatively early in the post-monsoon period of 1985) the first task is the gathering of *palo* (leaf fodder) from various naturally occurring bushes including the *ber* in bush form. These are cut off at ground level by means of an angled blade of heavy metal attached to a handle (a *jarbar*). The bushes are then gathered into piles where they are beaten with a *lathi*. The edible fodder (the leaves) is gathered and stored. The branches are kept as firewood.

A second task is the cropping of *khejri* trees. Branches are lopped off and the same process of separation of edible material and firewood occurs. The trees themselves are not cut down, although the pruning is very severe. A small amount of green growth is always left and the trees are said to rejuvenate very quickly. Small trees are not cut. The trees apparently regenerate very quickly. According to one informant this takes

only about four months, although I assume that this would depend very much on conditions.

An estimated 10 kg of *loong* (edible leaves) can be cut from each tree. In the case of a particularly big tree, about 40-50 kg of branches and leaves are cut, of which about 10-15 kg is *loong*. The rest is used, and sometimes sold, as firewood.

This gathering of fodder occurs only on private land. Labour can either be household labour, or, where large amounts of land are involved, hired labour is used. The work groups tend to be small and the cropping of *khejri* in particular is often done on an *ad hoc* basis. For example a woman or child from a household will simply go and cut a small amount from a tree to meet immediate needs.

The Herding Cycle

Herding, unlike farming, is a year round activity. Nevertheless, the nature of herding activity changes with the agricultural cycle.

Village land falls into two types in terms of ownership/access. The first category is Panchayat land, effectively common land available to all villagers for grazing throughout the year. According to local rules, fodder cannot be collected for storage from village common land, although animals are allowed to graze freely on grass, bushes or branches. Theoretically, sanctions can be imposed by a village assembly, but this rarely, if ever, occurs, perhaps largely because the rules are not often broken. The village assembly supposedly meets twice yearly, although it certainly never met at any time when I was in Hinganiya. The sanctions which can be imposed are beatings and fines.

The second category is privately owned land. In the agricultural season land-owners control grazing on their land. Agricultural workers may bring a cow, goat or camel and tether it to bushes at the edge of a field while they work, or the land-owner's livestock may be carefully grazed on stubble, under close supervision to prevent wandering into unharvested crops. Until harvesting is completed (and this includes the harvesting of stalks for off-season or emergency fodder), great care is taken to protect the rights of land-owners from grazing animals. Once the entire process of harvesting has been completed there is no reason why other herdsmen cannot graze their herds on private land, although care must be taken to protect *khejri* trees which are regarded strictly as private property.

Jodha (1985) describes off-season access to farming land as seasonal common property. This implies that seasonal open-access is a recognised right. In my opinion it is not so much a formal right as an activity tolerated because it is advantageous to the landowner. The amount of

fodder available (particularly once the stubble from crops has been consumed) is negligible. From the owner's point of view the benefits from manure outweigh the loss of potential fodder. Very little artificial fertiliser is used, so manure is a major contribution to soil fertility. In fact, visits by large flocks from outside the village are welcomed and fees are, according to some informants, sometimes paid to migrating herdsmen in return for the manure resulting. The payment of fees by the landowner, reinforces the view that the land is regarded as private, even in the off-season.

Vincze (1980) suggested that agro-pastoral economies include some factors which promote integration and some factors which work against it. Integrative factors include the opportunity to exploit marginal lands and the use of manure to fertilize fields. Among the anti-integrative features are conflicting labour requirements. Conflicting labour requirements certainly complicate the integration of agriculture and pastoralism in western Rajasthan.

The agricultural season has a number of implications to the labour requirements of herding. Firstly, during the agricultural season, requirements for herd supervision are increased. The main reason for the high labour requirement is that different types of livestock need to be grazed separately. Sheep and goats are grazed together, but cattle, buffalo and camels have different fodder needs. These larger animals are often tethered and hand fed, but the collection of fodder or the carrying of fodder from storage both require significant labour. Secondly, most men (and, often, women) are involved in agricultural work, either as landowners or as paid agricultural labourers. This means that herding duties fall on children between six and twelve years old. In the case of the Rajputs girls do most of the work, because most Rajput boys go to school. The boys look after livestock after school and on holidays. Among the Nayaks and Meghwals, on the other hand, it is common for boys to carry out this task, as school attendance is rare for either sex among these two castes.

In the agricultural off-season labour requirements and practices differ. Men usually have considerable time available (unless they are involved in government sponsored famine relief projects) and they may become involved in herding themselves. Supervision of herds tends to be easier, since there is no worry about damaging crops. In fact cattle and buffalo are often allowed to roam freely. They return home at night and there are no large predators. Sheep and goats, on the other hand, require supervision since they do not have a homing instinct and are subject to

predators.[6] Camels, which often wander long distances are either tied to a tree or hobbled while grazing. They, therefore, require fairly constant, but not onerous, supervision. All livestock are kept in stalls at night (or, in the case of larger animals, at least tethered) in all seasons. In winter, temporary shelters are sometimes provided for cows.

The relationships between the annual cycles of agricultural and pastoral activity described above depends on there being a monsoon. When the monsoon fails the situation is different. Obviously increased labour requirements due to the need to protect crops do not apply. On the other hand herd migration may occur.

Herd Migration

There is no *regular* pattern of herd migration in Rajasthan. Migrations, even quite extensive migrations, occur frequently, but the extent of migration, direction of migration, and even whether migration occurs in a given year, depend on the particular conditions which apply in a given time or place. Migrations are much more extensive during droughts and animals from Jodhpur District may migrate as far east as Delhi, or as far south as Gujarat. In good years migrations may, if they occur at all, be of very limited extent.

In the early winter of 1983, following a good monsoon, some Raikas (a caste of specialist herdsmen) were migrating through Hinganiya with flocks of sheep and goats. I interviewed one such herdsman from a village a few kilometres away. His migration was in the form of a circle of only thirty or forty kilometres diameter. It seemed to be necessary simply because of the number of animals (about 400 sheep and 25-30 goats). The herdsman was accompanied by a few male kinsmen. Their families had remained in their village. In a good season small domestic flocks can graze locally, but larger flocks (such as those owned by specialist herdsmen) need to move around somewhat. Even for these larger herds migrations are not necessarily extensive.

The situation in late 1983 was in extreme contrast to the situation a few months earlier, before the monsoon and following several years of drought. At that time I found few specialist herdsmen in either Jaisalmer or Jodhpur Districts because most of the livestock had been taken away. In late 1985 and early 1986 a similarly extensive migration was beginning. Herds of all species were passing through the vicinity of

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6 The main predator is called a *chali-nahar*, which is apparently a caracal or a desert cat, although few people have seen one and there is something of a mythical air about it. Some sort of small predator does undoubtedly exist and I have seen a cat-like track in the sand which was described as a *chali-nahar* track. There are also foxes and jackals.

Hinganiya, particularly from Jaisalmer and Barmer Districts which had been very severely affected by the drought. I saw herds of up to several thousand sheep and goats and other herds of fifty to one hundred camels. Unlike the situation in post-monsoon 1983, the herdsmen were not all Raikas. Sindhis, Mussalman and Rajputs were all involved as the drought had forced all people with livestock in the affected areas to migrate. In late January 1986 I spoke briefly to a group of Rajputs from Jaisalmer who were heading east in the vanguard of a party with camels, sheep, goats, donkeys and cattle. They were, like my hosts from Hinganiya, Bhati Rajputs of the Bera Dasot lineage. Even with the momentary excitement caused by the meeting of 'brothers', they were in too much of a hurry to stop for more than a few moments before following the rest of the party. There were no women or children with the party - they had remained in their village.

In my 1985-86 survey of households in Hinganiya, I asked whether any households would be migrating with their herds as conditions became worse. Only one household head (a Rajput) said he would be doing so and he intended only to take his sheep a few kilometres to the east. He was, in fact, the owner of the biggest flock of sheep in Hinganiya. As it turned out, his flock was decimated by an epidemic in January 1986, and the trip would not have been necessary.

In Hinganiya there are no people engaged purely in pastoralism. In fact the herds, while important, are comparatively small. At least while supplies of fodder remain, migration is not necessary. Further, given the extent of the 1985-86 drought, short migrations are no real solution and there is a natural reluctance to take very small numbers of livestock to other states. I suspect, however, that a longer drought (like the one that ended with the 1983 monsoon) will lead to migrations by even small owners.

I have pointed out the importance of migration as a response to drought and/or season variations in grazing conditions. One of the implications of the dual agro-pastoral economy is that it is not always convenient for a livestock owner with *relatively* small herds to migrate with them himself, particularly as his labour will be necessary for planting when, and if, the next monsoon comes. For this reason specialist herdsmen (usually Raikas) are sometimes used to look after animals on such migrations.

Migrations aside, even within the village grazing lands it is not always practical to allocate household labour to look after a relatively small number of animals. One herdsmen can certainly look after larger flocks than the ten or twelve goats or sheep owned by many villagers (although, as I have shown, mixed herds are a different proposition). The most common solution is simply to amalgamate herds. A number of related

households may put all of their animals in the hands of one or two herders. A second solution is to place animals in the hands of a paid shepherd for the purpose of day to day herding. In Hinganiya, where there are no resident Raikas, this herdsmen can be from any of the castes. However, in all of the cases I am aware of, the hired shepherds were Nayaks or Meghwals who looked after livestock owned by Rajputs and herded them with their own animals. Payment was more likely to be gifts of clothing or food than cash. In fact, the arrangement resembled patronage, a subject which I will turn to in Chapter 9.

Intensification of Agriculture and Risk Management

According to Maclachlan (1983) one solution to the risk of drought is intensification of agriculture.

The agricultural cycle described above has not been subject to major innovations. High yielding varieties of various crops, including millet are available, but are rarely used in Hinganiya. The potential increase of *bajra* production through the use of HYVs is impressive. Villagers' estimates for the yield of *hybrid* (as HYVs are collectively called locally) in a good year were 250-300 kg per bigha, representing a 50 to 100% increase on production using *desi* seed. This is consistent with Murty's estimate for improved management of *bajra* 'particularly with hybrids' (1976: 46). Despite this increased potential, few farmers report using *hybrid*.

Hybrid seed is relatively expensive, costing (in 1987) Rs 30 per kg, or Rs 60 for three kg. Informants certainly describe it as expensive. In comparison, *desi* seed is easily obtainable from the previous year's crop. Yet, in absolute terms, the seed cost of *hybrid* is not prohibitive. It also needs fertiliser (urea), whereas fertiliser is rarely added to *desi bajra* under rainfed conditions, the main source of nutrients being manure from grazing animals. The cost is a bar, but probably only a minor one, except to poor farmers.

The main disadvantages are that HYV seed is relatively subject to disease and requires a comparatively large amount of water. In contrast, *desi* seed is highly drought resistant and relatively disease resistant. The selection of millet in the first place, is primarily a result of its high degree of natural drought resistance.

Those farmers who use *hybrid* tend to be relatively wealthy, although one smaller farmer (Category 2) claimed to use it. Even those who do use *hybrid* tend not to use it all the time. One large farmer in Kur, who had irrigated land as well, used both types. The reason for non-adoption is clearly related to the increased risk associated with HYVs. Following the safety-first principle (Scott 1976), poor farmers are unwilling to take the

risk, and even larger farmers hedge their bets. There is, of course, nothing new in this pattern of HYVs being rejected by small farmers on the basis of higher risks.

One form of intensification of agriculture is the increased use of marginal land for cultivation. This is an important trend in Rajasthan (Jodha 1980), but it appears not to have occurred in Hinganiya. In Chapter 5, I showed that land classified as agricultural land changed little in Hinganiya between 1947 and 1986. This was largely because almost all available land was identified as agricultural land in 1947.

Jodha identifies another form of intensification. He points out that during the period of the *jagirdari* system 'the peasants could satisfy their increased demand for cropland only through reduction in the extent of long fallow' (1985:257). In a situation where the absolute amount of land available is limited, a similar form of intensification could operate. This suggests the possibility that, while the amount of agricultural land in Hinganiya has not changed much since 1947, it may be used more. This may have occurred, although I have no evidence to support it. However, given my reservations about regularity of fallow, the effects, either in terms of increased production or increased damage to soil, would be marginal.

Superficially, the most obvious opportunity for intensified inputs is through irrigation. As there are no naturally flowing streams or rivers in Hinganiya or in nearby villages, riverfed irrigation is not an option. Further, the land is relatively flat, so water from rainfall collection areas cannot be carried far in canals. There are several other possibilities.

Rainwater harvesting techniques (Pacey and Cullis 1986) can allow farmers to collect water when it rains. The techniques include the construction of underground tanks and the collection of water on contoured surfaces, sometimes behind artificially constructed bunds. This latter technique is used in Rajasthan, where the area behind the bund is known as a *khadin* (Pacey and Cullis 1986:135-36). The *khadin* requires land which is not too flat. The main water harvesting effect of bunds in Hinganiya seems to be to trap moisture in the soil for the benefit of sections of crops grown near the bunds themselves, rather than to trap water to be re-channeled over a field. As I was never able to see how fresh rainfall was distributed within the fields (I didn't see rain fall very often during my fieldwork), I do not have much data on relevant practices.

There are other methods of collecting and storing rainwater, although they are of little value for agriculture. One artificially constructed earthen pond or lake (*nadi*), for the collection and storage of rainwater exists in Hinganiya and such *nadis* are relatively common in the region. The main value of *nadis* is for watering livestock after the monsoon, but

evaporation is rapid. Building *nadis* is one of the most common forms of drought relief projects, since the process is essentially one of digging a large hole and since it requires only readily available tools and little supervision.

Underground tanks are sometimes built in the fields or in the *abadi*. They can be filled from a mobile tank, but also have a dishlike catchment area of up to twenty metres diameter, shaped around them. They are, however, expensive since they need to be lined and covered to avoid evaporation. (Minimum costs for lining and covering are in the order of Rs 2-3000.) Those that exist are mostly privately owned, and are mainly used as a supplementary supply of private drinking water. However, two large tanks on Panchayat land were built in the past, at least one for a famine relief project. The water for these is used both for human and livestock needs. One of the tanks is connected to the pipeline.

Machlachlan describes the digging of private wells as the most productive form of agricultural intensification in Yaahvahalli, the village in south India where he worked. Most irrigation in Jodhpur District is by well or tube-well. However, in Hinganiya, saline water makes this option unviable. The only attempt to dig a private well of which I am aware led to the expected result that the water was unusable. (The water from that well is now used for making bricks.)

All this sounds rather hopeless; surely something is possible as a means of improving production?

The main local solution, as applied to agriculture, is in terms of risk management. This works in a number of ways, many of which were mentioned by McAlpin (1983). The first technique open to landowners is plot scattering. Farmers prefer to own plots separated from their other plots. Microclimatic variations can damage crops in one area, leaving plots elsewhere in the village unaffected. One common cause of this is high wind. Although the region is not hilly, there are mild undulations, and plots facing different directions limit the risk of losing all crops due to a single heavy wind or prevailing winds. Even rainfall can differ in patches within a village. In 1987, while very little rain fell at all, there were some patches where scanty rain fell, particularly on the eastern side of the village. Most of the village crops failed completely, but there was some small *bajra* production in these scattered patches.

Plot scattering is of little relevance to poor farmers who own a single plot. Further, as land transfers are rare, most farmers have little ability to change the position of their plots. Fortunately, in the past, tenants apparently had use of scattered plots and this situation has continued into present landholding patterns. One way of getting around the inflexibility of current plot location is through a tenancy (or sharecropping) arrangement.

Another simple strategy for risk management is diversifying crops. Certain combinations are quite common in Hinganiya. The chances of losing two different types of crop to a disease at the same time are considerably less than the chances of losing a single crop. Further, the secondary crops are usually crops like *moong* or *moth* which are valuable supplementary foods and which have high market value if there happens to be a good crop.

However, the single most important aspect of risk management is involvement in a mixed agro-pastoral economy. One of the major aims in this chapter has been to show that the activities of agriculture and pastoralism are rarely in direct conflict in the area under discussion. On the contrary, they generally complement each other, particularly in that pastoralism provides essential fertiliser and agricultural crop residues provide fodder.[7] Labour demands are the main area for conflict, and this is limited. There is a peak in labour demands for both activities during the agricultural season, but most of the tasks of pastoralism can be performed by children who don't work much with crops anyhow.

The advantages of involvement in pastoralism far outweigh the disadvantages. Firstly, it provides milk, a basic subsistence need. Secondly, production from pastoralism is not so susceptible to drought. It is argued (CAZRI 1983, quoted in Robinson 1985) that, while crop production on rainfed lands in a drought year can be less than 10% of the production in a good year, milk and wool remain above 50% of good year levels. Thirdly, pastoralism can provide a useful cash income, even when crops fail. Providing the basic reproductive animals are not sold or lost to the drought, livestock herds can regenerate. The rate of regeneration of goats and sheep is much greater than that of the larger (and more expensive) livestock, thus making them better as an insurance against risk and making them a particularly attractive option for poorer farmers.

The value of small livestock is enhanced by the fact that prices for sheep and goats are not badly affected by decreased prices during droughts. For example, in 1983 and early 1984 male goats sold in Hinganiya for Rs 100-150. The price was similar in 1985, although conditions were much worse. This price stability is probably due to a relatively stable supply and demand for goats for meat. The supply will tend to remain much the same until breeding stock die off (or until prolonged drought reduces their fertility), because most young male goats are sold for meat anyhow. Once breeding stock die off supply of young males will drop, presumably forcing prices up rather than down. Demand, which is largely for urban consumption, will tend to remain constant.

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7 Singh cites a saying by a renowned Raja '. . . which means that whoever has a couple of Khejiri trees on his land and a camel and goat will not die of starvation' (1943: 10).

Given the obvious advantages of small livestock, including their potential herd growth, the relatively low labour demands and stability of prices, it is somewhat surprising that more small farmers do not develop a greater reliance on them. I remain uncertain as to why this is so, although I suspect that the frequency of drought leads small farmers to sell their breeding stock.

While small livestock are particularly good as insurance, the emergency sale of large livestock also has a role during droughts, although prices are naturally depressed as supply increases. Large livestock are sold at a market called a *mela*. The famous Pushkar Mela is the best known of these, although there are many others.

The sale of valuables to provide cash in years of poor income is one way of coping with bad years (McAlpin 1983). Morris (1975) has argued that the sale of assets is not an indicator of crisis, but, rather, that it is a routine mechanism for coping with drought. However, Jodha (1975) counters that the sale of assets is, in fact, an indicator of economic distress due to drought. It occurs only after cut-backs in consumption have occurred and is a sign that the situation is getting serious. Jodha differentiates betwen sale of valuables, such as household goods and jewellery, and sale of reproductive assets, that is assets which provide for the reproduction of an economic level (such as land, female livestock, a tractor). Sale of valuables (non-reproductive assets) is preferred as an early response ahead of the sale of reproductive assets.

In essence, this is a sound differentiation in terms of the relative merits of various sales. Sale is a common adaptive mechanism. Even poor Rajasthani women have some gold or silver. Richer women (and men) sometimes have huge amounts. (I photographed a Brahman couple in Kur, when they were wearing what I estimated to be Rs 100,000 in jewellery, mostly gold.) However the sale of jewellery is not undertaken lightly. Jewellery functions as an insurance mechanism, but it also has high prestige value. Sale of jewellery is a sign of distress, although a less serious one than the sale of land. Further, once jewellery has been sold the next step (if bad conditions continue) will be the sale of land, female livestock, or, occasionally, valuable male livestock (such as working camels). However, unless a long string of bad years occurs it is often possible to reinvest in jewellery (as a future buffer) before selling productive assets. The poorer farmers, of course, do not have as a many non-productive assets and must cut into their productive base much earlier. A long series of droughts would probably have no long-term effect on richer farmers, but may push poorer farmers off the land.

In 1983, one Nayak owned a camel and a cart, from which he earned considerable income during the good 1983 season (about Rs 50 per day when working). By the time I began my second period of fieldwork in

1985 he had sold the camel and cart, but purchased a new and younger camel. The sale had been forced by circumstances (limited work during two bad seasons). Although forced to sell his first camel and cart, he attempted to maintain a hold on the future by buying a young camel for future use. In the worsening conditions after the 1985 monsoon failure he tried to avoid selling his new camel for as long as possible, but was forced to do so and went off to look for work in Jodhpur. Yet, even during the 1985 harvest season (such as it was) he had attempted to get money together to buy jewellery for his wife. In other words, even in the midst of a drought, he was concerned with maintaining his productive base and building as much of a buffer (in the form of jewellery) as possible, in anticipation of further lean years.

The camel was sold at a *mela*. The camel, a young bull, had been purchased two years earlier for Rs 2100. The Nayak expected to be able to sell it for Rs 3-3500, but ultimately settled for Rs 2750.

The buyers for livestock at *melas* often come very long distances, including from other states. The *melas* in 1985-86 were particularly busy as villagers sold livestock off at reduced prices to buyers eager for bargains. For all this, one villager took advantage of the prices, selling a buffalo and buying a camel and cart at reduced prices. While the sale of valuable livestock at less than optimum prices can be interpreted as a sign of desperation, it can also be argued that purchasing the livestock in the first place is an insurance strategy.

A theme that keeps recurring in this analysis is the notion that poorer farmers are consistently less able to take advantage of risk managment options than better-off farmers. At this point I would like to analyse a 'notional' household budget for a small farmer to indicate just how inadequate on-farm income can be. (For this purpose on-farm income refers to income either from the personal landholdings or, through wage-labour, from the farms of other farmers.)

Balancing the Household Budget

The household is the basic economic unit. To make sense of differing responses to drought it is most useful to start with the household. In Chapter 5, I discussed my use of the term consumption unit (c.u.). While the term has, of course, only a very general indicative or notional value, it gives a reasonable order of magnitude for considering subsistence demand and provides a basis for comparison between households.

Table 6.8 provides an estimate of monthly cash requirements for an average household of 3.5 consumption units. The estimates of monthly requirements for various goods were provided by an informant in 1983. Interestingly the prices in January 1986 were the same for all major

items. Staples (essentially millet, but including milk and other subsistence products) are excluded, because I am initially concerned with cash requrements.

Table 6.8

Estimate of monthly cash requirements

(Household of 3.5 Consumption Units)

Item		*Price (Rupees)*
Tea	1/2 kg	20
Salt		3
Sugar	5 kg	30
Oil	1 kg	18
Matches	6-7 boxes	1/50
Kerosene	1 litre	3
Bidis	6 Pkts	4/50
Tumeric, Ghi, Chillies, Vegetables		20
	Total	*100*

My calculations suggest tha Rs100 would meet the monthly 'grocery' bill - tea, salt, sugar, kerosene, spices, vegetables. This is not a generous budget, but conforms fairly closely to the likely needs of an average sized houshold. Obviously poorer people could economise slightly on some items. (In fact people buy 50 gm packets of tea for Rs 2, or buy poorer quality tea and drink less tea). To an annual grocery bill of Rs 1200, I would add a further Rs 300 per year for clothes, buckets, ropes and other miscellaneous items. This is very spartan, but fits the expenditure of poorer households. The total annual requirement is about Rs 1500.

So much for minimum expenditure. What about income? If we take a small household in landholding category 1 (owning under 2 ha) it quickly becomes apparent that the situation is very tight, even in a good year. I will take as an example a household of 3.5 c.u. owning 10 bighas (1.6.ha) of land. Allowing a rate of production per bigha of 175 kg, which is probably a little on the high side, the total production would be 1750 kg, in a very good year. Allowing twenty-two kilogram per month per c.u. a household of 3.5 c.u. would need 924 kg for a years supply, giving a balance of about 800 kg. Following the 1983 agricultural season this would have had a cash value of Rs 1400 (Rs 1-75 per kg). Of course, for

a poor farmer, selling would be a very drastic step, because it would leave no reserve for a bad year. In drought years purchase of the same amount of grain would cost considerably more. Assuming 50% production over a four year period the household would produce only 3500 kg, barely enough to meet domestic needs. In fact 1983 was preceeded by four drought years and followed by one satisfactory year and then by several more drought years. In any case 50% production is very optimistic: I have suggested that an average 20-30% of optimum production is more likely over a lengthy period.

We can, however, for purposes of discussion, talk in terms of potential cash income from land, *in a good year*, of Rs 1400, bearing these constraints in mind.

Working as a labourer, either on drought relief projects before a drought broke (at Rs 7 per day) and as an agricultural labourer (at shifting rates) for a notional 100 days (most informants report less paid working days) would probably amount to another Rs 700 (plus one meal per day in farm work). Sale of about five male goats per year from a herd of ten female goats would provide another Rs 750.

In all, the potential cash income (excluding extra-village income) in a good year amounts to Rs 2850, which is in excess of the Rs 1500 cash requirement. But it must be remembered that the income projections are very much on the generous side, and they refer to a good year only. On-farm labour opportunities in a poor year are less and pay is less (because the supply of labour enables employers to employ labourers at cheaper rates).

In a bad year, or when a series of bad years are strung together on-farm income (from the farmers own land and from paid labour on other farms) would be much less. Obviously there must be substantial deficit for a small landowner.

These figures are deliberately based on generous estimates of income and conservative estimates of costs. The purpose of the exercise is to show that, even on the most optimistic estimates, the net income of small landholders simply cannot meet needs except in good seasons and that, in terms of income and expenditure, they must be in net deficit over a period with a statistically average range of conditions. The implications of this will be explored in Chapter 9.