Appendix 2A Global breed data

Sub-Saharan Africa,
a total of 738 breeds have been recorded. Around 15 percent of extant breeds on file are at risk. "This is believed to be a gross underestimate of the actual situation," the report said. "The trends for the African region are alarming: The number of mammalian breeds at risk of extinction has increased from 8 to 19% since 1995. The situation with bird breeds is even more serious with the total percentage of breeds at risk of being lost increasing from 20% in 1995 to 34% in 1999."

The ***Asia and Pacific region*** contains more than one-fifth of the world's animal genetic resources, with 1,251 domestic animal breeds recorded. The majority of the world's buffaloes and yaks, almost half of its muscovy ducks, pheasants and partridges, one-third of its pig breeds and one quarter of its goat breeds are found in the region. Of the 1,251 breeds recorded, around 10% are at risk. The figures also are underestimated, FAO said. Between 1995 and 1999, the proportion of mammalian breeds at risk of extinction in the Asian region has increased from 11 to 14%, of bird breeds at risk of being lost from 32 to 37%.

In ***Europe***, a large number of breeds are endangered because of their perceived lack of economic competitiveness. The poultry and pig industry are relying on only a handful of specialized breeds. Especially critical is the situation in Eastern Europe with only a few conservation programs in place. "The current uncertain political climate in the region will accelerate the loss of many breeds," FAO said. Of the 2,576 breeds recorded in Europe, almost half are considered at risk. Between 1995 and 1999, the number of mammalian breeds at risk of loss has increased from 33 to 49%; the number of bird breeds at risk of being lost has grown from 65 to 76%.
Over a quarter of the world's cattle, goat, sheep, pig, duck and turkey breeds and over a half of the world's horse, chicken and geese breeds are recorded in Europe.

In ***Latin America***, around 20% of extant breeds on file are considered at risk. The total proportion of bird breeds at risk of being lost increased dramatically from five percent in 1995 to 45% in 1999. "These figures are alarming and efforts must be made to encourage maintenance of the genetic resources at risk. We must better understand this seemingly very serious situation," FAO said.

In the ***Near East***, much of the domestic animal diversity is now under threat of extinction due to intensification and mechanization, FAO said. Current data is not available for many countries because of unrest and drought. Eight percent of extant breeds are considered at risk (44 of 571), but the real losses are probably much higher.

In ***North America***, "many breeds that were once considered quite valuable have now been confined to the genetic wastebasket," the report said. As in other regions, the continued drive towards intensification and specialization has resulted in the increased reliance on a small number of breeds to meet the demand for food. Of the 259 breeds on file, 35% are threatened by extinction.

Source: http://www.waternunc.com/gb/fao16gb.htm

Appendix 5A List of respondents

Date of interview	Name of respondent	Village	Sex (M/F)	Age	Education
16/02/2001	Bagteram Raika	Gudajata	M	55	None
17/02/2001	Nataram Raika	Rajpur	M	35	None
17/02/2001	Ambu Devi	Chowdajupa	F	35	None
17/02/2001	Baburam Raika	Khuni Bavdi	M	37	None
22/02/2001	Amboram Raika	Datiwara	M	55	none
22/02/2001	Nataji Dewasi	Bedel	M	51	None
22/02/2001	Hajiram Raika	Datiwara	M	50	None
24/02/2001	Vaktaram Raika	Kot	M	60	None
24/02/2001	Hanja	Kot	F	40	None
24/02/2001	Buraram Raika	Kot	M	50	None
24/02/2001	Hidu Raika	Kot	M	50	None
25/02/2001	Harjiram Raika	Sadalwa	M	50	None
25/02/2001	Jotaram Raika	Sadalwa	M	22	None
25/02/2001	Pimaram Raika	Sadalwa	M	30	None
26/02/2001	Malaram Raika	Datiwara	M	60	None
26/02/2001	Sita	Datiwara	F	13	None
26/02/2001	Junu	Datiwara	F	30	None
28/02/2001	Janu	Mundara	F	13	None
28/02/2001	Jagaram Raika	Mundara	M	50	None
28/02/2001	Hemaram Raika	Mundara	M	35	None
28/02/2001	Ganeshram Raika	Joba	M	30	None
28/02/2001	Punaram Raika	Joba	M	40	None
06/03/2001	Puraram Raika	Bijapur	M	35	None
06/03/2001	Pommaram Raika	Bijapur	M	68	None
06/03/2001	Sukli	Bijapur	F	22	None
07/03/2001	Bhawaram Raika	Mandigar	M	17	7th class
07/03/2001	Ambaram Raika	Mandigar	M	50	None
07/03/2001	Sewaram Raika	Mandigar	M	50	None
13/03/2001	Rhakmabhabi	Bhagibanri	M	40	None
13/03/2001	Otaram Raika	Bhagibanri	M	50	None
15/03/2001	Amararam Raika	Sinderli	M	60	None
15/03/2001	Nilaram Raika	Sinderli	M	40	None
15/03/2001	Manaram Raika	Bamania	M	45	None
15/03/2001	Juwaram Raika	Bamania	M	55	None
15/03/2001	Wennaram Raika	Malari	M	25	None
15/03/2001	Thamaram Raika	Malari	M	42	None
21/03/2001	Punaram Raika	Lartara	M	25	None
21/03/2001	Babulal Dewasi	Dungli	M	55	None
22/03/2001	Nataram Raika	Mada	M	65	None
22/03/2001	Jodaram Raika	Mada	M	70	None
22//03/2001	Kanaram Raika	Pachalwada	M	45	None
22/03/2001	Raltaram Raika	Pachalwada	M	31	None
24/03/2001	Punaram Raika	Sobawas	M	25	None
24/03/2001	Walaram	Desuri	M	45	None
24/03/2001	Sagramba Raika	Khunibavdi	M	70	None

25/03/2001	Jobiram Raika	Rhamnia	M	?	None
26/03/2001	Buwaram Raika	Bhitwara	M	40	None
26/03/2001	Beraram Raika	Muthana	M	40	None
26/03/2001	Bomaram Raika	Muthana	M	35	None
27/03/2001	Vaktaram Raika	Bilhija	M	50	None
29/03/2001	Rengaram Raika	Rangura Ki Dhani	M	32	None
30/03/2001	Ambaram Raika	Ghanerao	M	?	None
30/03/2001	Jamaram Raika	Charbuija Ki Dhani	M	40	None
01/04/2001	Selaram Raika	Sumer	M	?	None
01/04/2001	Amboram Raika	Ghanerao	M	45	2nd class
01/04/2001	Modaram Raika	Magartalab	M	60	None
02/04/2001	Manglaram Raika	Wara Solenkian	M	13	6th class
07/04/2001	Jogaram Raika	Dadai	M	35	None
12/04/2001	Ambu	Mundara	F	80	None

Appendix 5B Interview guide

☐Data on Respondent

1)Name of respondent:……
2) Name of village:……
3) District:……
4) Sex: Male/Female 5) Age:……..yrs
6) Other household members:……
7) Education:……..

☐Data on land available to household and crop production

8) What is the size of land in ownership:.....Begha
9) What crop(s) is/are grown:

☐General data collection of sheep husbandry and healthcare.

10) Herd composition and herd size:

	Breed*1						
	Boti	Dumi	Bhagli	Wannermi	Tepli	Keri	Other
No of ewes							
No of rams							
No of lambs							

*1 Local classification of sheep breeds: Boti, Dumi, Bhagli, Keri, Wannermi, Kajeli and Tepli.

11) How would the respondent describe all the different breeds (color, tail and ear size and shape etc)?
12) What are the specific qualities of each breed?
13) Did your herd increase or decrease over the past 10 years and why?
14)Labour division:

	Men	Women	Other family members	Children	Hired labour	Other:…… ……..
Herding						
Feeding						
Drenching						
Milking						
Handling milk						
Assisting ewes in labor						
Care for young animals						
Care for sick animals						

15) Which rams are used for service?
16) What is the age at first service (both for ewes and rams)?
17) In which season are the lambs born?
18) At what age are male lambs sold?
19) For what purposes are the sheep kept (wool, milk, dung, meat, ghee)?
20) Which products are for home-consumption and which are for selling?
21) Are sheep taken on migration, if so in which months?
22) Controlled breeding? If so, what kind of system is employed?
23) Are sheep (and goat) given names?

☐ Data on knowledge and perceptions of sheep diseases.

24) Which disease(s) affect your sheep mostly (quantity)?
1)…… 2)……
25) What diseases did your sheep have the last 2 years?
1)..... 2).....
26) How much animals died the last year; adult....., lambs.....

Of what disease did they die?....
1)..... 2).....
27) Which disease causes the most deads in your herd?
1).....2).....
28) For what disease people go to: Bhopa:.....
Ghuni:.....
Daam:.....
29) Do people go to the veterinary hospital or cal for a veterinarian?
If so, for what diseases:……..
If not, why not:……

30)What treatment is given for:
gogla (bottleneck): ……
fatgiya (enterotoxemia): ……
khurpak (foot and mouth disease): ……
mata (sheep pox): ……
thakla (fatigue): …….
haldariya (haematuria):……..
Sindura/Hindura (?respiratory disease):.....
Nimji (?orf):.....

31) Look at 24-27 and ask details about the mentioned diseases.

Causes

1) What causes the animal to get sick?
Why does the animal get sick?
Was it caused by something the animal ate or drank, was it caused by another animal or person?

Diagnose/symptoms

2) How can you see that the animal is sick?
How does the animal look?
Does it have diarrhoea, no apitite, is it restless, mucus from nose and mouth?
3) For how much time does the disease occur?
How much days passed since you first discovered the disease until the animal cured?

Mortality

4) Do animals with this disease die?
5) Do all animals die, many or few?
How many animals who caught the disease will actually die from it?

Contagiousness

6) Do all animals catch the disease at the same time or only one or two?
7) Can healthy sheep get the disease from sick sheep?
8) Which sheep are affected (rams, ewes or lambs)?
9) Which sheep are most severely affected?
10) When was the last time a sheep was affected by this disease?
11) In which season are sheep more affected?

Treatment

12) What do you do to cure the sheep?
How do sheep cure from this disease?
Do you use medicinal plants, vaccines, medicines, prayers, surgery, other?

If other than medicinal plants are used describe treatment and materials:
……
(The following part 13 t/m 23 was only partly used during the interviews due to time constraints)
(Fill in question 13-19 if medicinal plants are used.)
13) What part of the plant is used?
Root, stem, leaves, flower, seed?
14) How is the plant prepared?
in water, fresh, dried, in boiled water, moulded, other?
15) How is the medicine administered?
Drenched, mixed in feed, injected, other?
16) What is the quantity used during every treatment?
How many leaves, flowers, plants and water is used?
17) How many times should the medicine be administered?
Once, daily, till animals cure?
18) Where do you obtain the plant?

Close to the house, during walks, near rivers and streams?

19) Can the plant be obtained year round?
In which season?

20) How did you learn this treatment?
Who taught the treatment to you?

21) Do animals cure fast after the treatment?
In how many days after treatment does the animal recover?

22) Do all animals recover after treatment?
Do animals die even if the received treatment?
Why do animals die?

23) From the different treatments which would be the most adequate?
Which treatment cures the highest number of animals?

☐Economics

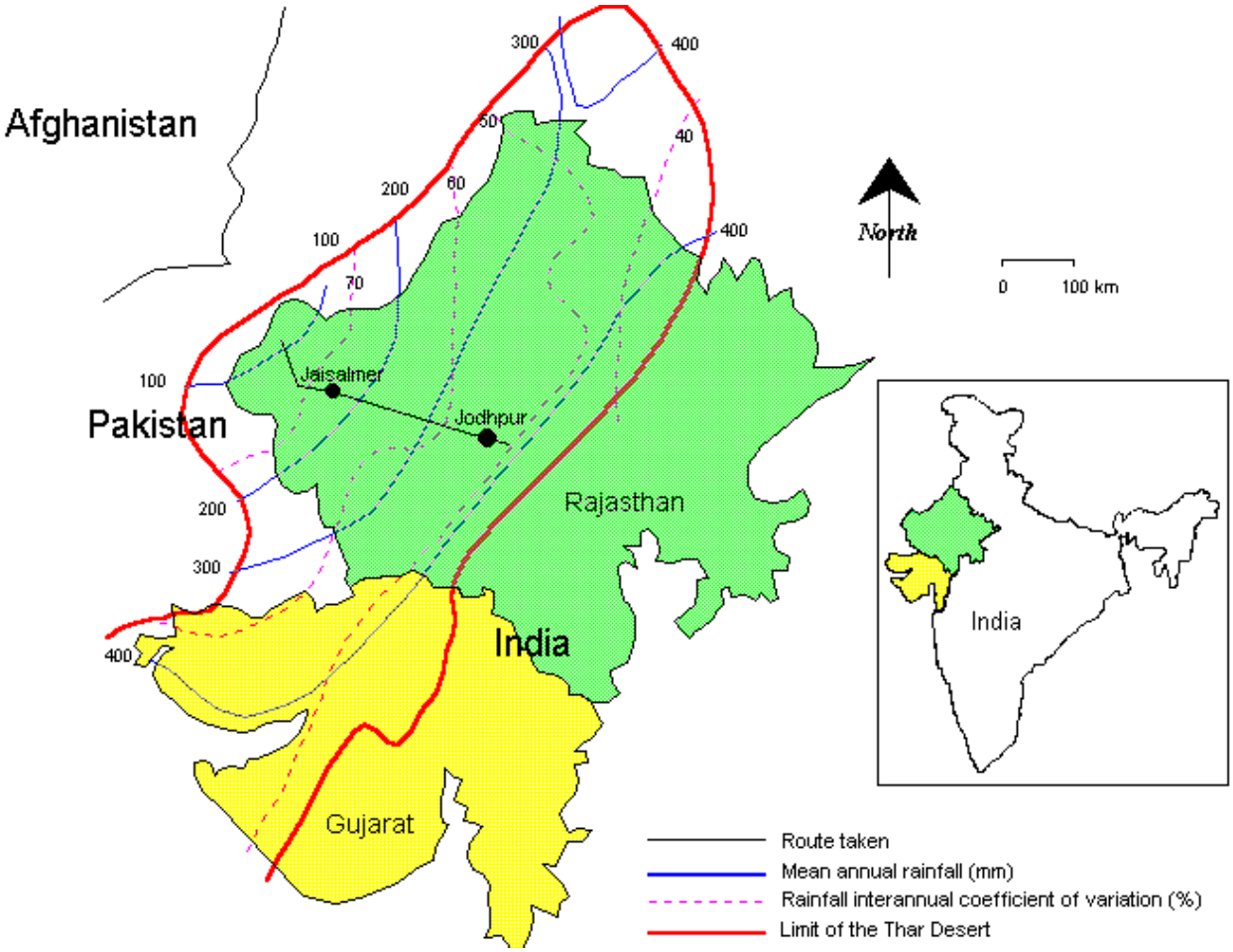
32) How much lambs did you sell last year (and of what age were the lambs sold)?
33) How much adult sheep did you sell last year?
34) How much wool did you sell last year?
35) How much dung did you sell last year?
36) How much ghee did you sell last year?

37) When there is a shortage of grazing ground what strategy is employed to overcome the fodder deficit? (e.g. buy fodder, sell animals, walk more km per day, go on migration etc)?
38) What does the respondent consider the biggest constraint/problem in sheep production (e.g. fodder deficit, lack of adequate medicines, lack of information, low prices for wool and meat etc)?
39) In what area would the respondent like assistance, advice or information or other services (e.g. assistance in disease diagnose, supply of medicines, legal help concerning grazing problems, service of superior rams etc)?

Appendix 5C Sheep breeds in Rajasthan

Common name	Other local names	Main location	Main use	Colour	Specific visible traits	Fibre type	Origin of breed
Avikalin		Rajasthan	Wool	Uni colour: white		Coarse/carpet	Developed at Research centre in Avikanagar from Rambouillet an Malpura in the 1970's
Avivastra		Rajasthan	Wool	Uni colour: white		Fine	Developed at Research Centre Avikanagar from Rambouillet and chokla
Chokla	Chapper, Shekhawati , Indi	Bikaner, Jaipur and Nagau in Rajasthan	1) Wool 2) Meat	Uni colour: white with dark brown face	Similar to Magra but smaller and finer wool	Coarse/carpet	
Jaisalmeri	Jaisalmer	Jaisalmer, Barmer and Jodhpur districtsof rajsthan	Wool	Uni colour: white With brown or black face	Long lop ears	Coarse/carpet	
Magra	Bikaneri (obselete), Bikaneri chokla, Chakri, Jangli, Mogra	East and south Bikaner, Rajasthan	1) Wool 2) Meat	Uni colour: white white face with light brown around eyes	Medium to large sized animal (approx. 63 cm)	Coarse/carpet	
Malpura	Desi	Eastern Rajasthan	1) Wool 2) Meat	Uni colour: white with light brown face	Short ears, long legs, similar to Sonadi	Coarse/carpet	
Marwari	Layda, Marwadi	Many districts of Rajasthan and Jeoria Region of Gujarat	1) Wool 2) Meat	Uni colour: white body, black face,	Medium-sized with small ears	Coarse/carpet	
Nali		Northern Rajasthan and southern Haryana	1) Wool 2) Meat	Uni colour: white light brown face	Long ears, medium-sized animals	Coarse/carpet	
Pugal		Bikaner and jaisalmer districts of Rajasthan	1) Wool 2) Meat	Uni colour :white with black face	Fairly well-built animals, short ears	Coarse/carpet	
Sardarsamand		Rajasthan	Wool				Composite of Australian Merino and Marwari, year of origin: 1935 onwards
Sonadi	Chanothar	Southern Rajasthan and northern Gujarat	1) Wool 2) Milk 3) Meat	Uni colour: brown, white with light brown face, neck and legs	Similar to malpura, but smaller with very long ears	Coarse/carpet	

Appendix 5D Distribution of rainfall in Rajasthan



Appendix 5E Age at first service for ewes and rams

Age at first service of ewes (n=32)

APPROXIMATE AGE AT FIRST SERVICE IN MONTHS	N	%
12 months, 1 year	9	27.3
15 months, 1.25 year	3	9.1
18 months, 1.5 years	4	12.1
21 months, 1.75 years	2	6.1
24 months, 2 years	12	36.4
30 months, 2.5 years	2	6.1
36 months, 3 years	1	3.0
Average age at first service is 19.7 months (1.6 years) standard deviation = 6.4		

Age at first service, rams (n=35)

APPROXIMATE AGE AT FIRST SERVICE IN MONTHS	N	%
12 months, 1 year	5	14.3
18 months, 1.5 years	6	18.2
21 months, 1.75 years	3	8.6
24 months, 2 years	16	46.4
36 months, 3 years	5	14.3
Average age at first service is 22.7 months (1.9 years) standard deviation = 6.9		

Appendix 5F Returns from sheep rearing.

FAMILY AND HERDSIZE	INCOME GENERATED IN RS. AND PERCENTAGE OF TOTAL INCOME			TOTAL INCOME	INCOME PER SHEEP PER YEAR
	MEAT	WOOL	DUNG		
Family 1, Herdsize 60	2000	1100	1500	4600	77
	43%	24%	33%		
Family 2, Herdsize 60	7500	1500	1200	10200	170
	74%	15%	12%		
Family 3, Herdsize 60	5500	480	2000	7980	133
	69%	6%	25%		
Family 4, Herdsize 150	10000	2700	1500	14200	95
	70%	19%	11%		
Family 5, Herdsize 200	12500	3600	3000	19100	96
	65%	19%	16%		
Family 6, Herdsize 200	16000	1000	7000	24000	120
	67%	4%	29%		
Family 7, Herdsize 100	11000	2000	2500	15500	155
	71%	13%	16%		
Family 8, Herdsize 100	6000	1800	1500	9300	93
	65%	19%	16%		
Family 9, Herdsize 50	5000	500	2400	7900	158
	63%	6%	30%		
Family 10, Herdsize 140	10000	2520	1000	13520	97
	74%	19%	7%		

Appendix 5G Disease characteristics as cited by respondents

Sindura

*Cause (n=7)
During the interviewees people gave several explanations as to what could be the cause of this disease. Some stated that the eating of a tree would cause this disease (43%) others stated that when sheep with a high body temperature (e.g. by standing in sun all day or by running for a long time) drink cold water they get this disease (43%). One interviewee replied not to know the cause (14%) of the disease. It is generally stated that healthy sheep can get the disease from sick sheep (86%).

*Symptoms(n=9)
-mucus discharge from nose (cited by 100% of the interviewees).
-animals are weak and have no appetite (cited by 33% of interviewees)
-coughing (33%)
-mucus discharge from nose and after some days blood discharge from nose (22%)
-mucus discharge with worms (22%)
-diarea (11%)

*Duration (n=7)
-10-20 days (43%)
-20-30 days (29%)
-1-2 months (14%)
- more than 2 months (14%)

*Mortality (n=7)
-very few (less than 5% of animals infected) die from this disease (43%)
-all sheep die from this disease (29%)
-animals do not die from this disease (14%)
-some animals die, around 20% of all animals affected (14%)

*This disease is said to affect all types of sheep, rams ewes and young stock. Furthermore it was generally stated that within a month the entire herd will have contracted the disease. One interviewee said that only 40 to 50% of the total herd will get this disease. Healthy sheep get the disease from direct contact, grazing and drinking with infected sheep.

*Seasonality (n=7)
-summer (43%)
-all year (14%)
-rainy- and winter season (14%)
-rainy and summer season (14%)
-winter season (14%)

Gogla (Bottleneck)
*Cause (n=7)
-drinking dirty water, eating dirty grass (43%)
-not known but healthy sheep get it from sick sheep by direct contact or by grazing and drinking together (14%)
-weak sheep drink cold water (14%)
-sheep eat grass in rainy season or wet grass in early morning (14%)
-not known (14%)

*Symptoms (n=7)
-swollen jaw/neck (100%)

-diarea (43%)
-fever (29%)
-weak, no appetite (14%)
-coughing (14%)
-mucus discharge from nose (14%)
-mucus discharge from mouth (14%)
-pain in neck (14%)
-difficulty breathing (14%)

*Duration (n=6)
-1 month (50%)
-10-15 days (33%)
-5-6 days (17%)

*Mortality (n=6)
-high mortality, 50% to 100% of all infected animals die (67%)
-20-25% of all infected animals die (17%)
-very few animals die (17%)

*Ewes, rams and lambs can get this disease, but 67% of the interviewees said that ewes are more severely affected, 17% said that adult sheep are most severely affected and 17% stated that ewes, rams and lambs are equally affected.
50% of the interviewees stated that this disease generally affects the whole of a herd within a short period. 17% replied that either few or a whole herd get the disease. One interviewee (17%) said that only some sheep get this disease.

*Seasonality (n=6)
-whole year (50%)
-winter and rainy (17%)
-rainy (17%)
-winter (17%)

Khurpak (FMD)
*Cause (n=10)
-causal agent not known, but healthy sheep can get it from sick sheep (50%)
-caused by some local brahman or spirit (20%)
-when sheep walk in mud (10%)
-caused by something in the air (10%)
-not known (10%)

*Symptoms (n=8)
-small lesions on feet (88%)
-animals have difficulty walking (63%)
-no appetite (50%)
-bloody discharge from feet (30%)
-fever (30%)
-lesions in mouth (30%)
-diarea (20%)
-maggots coming from lesions (20%)
-pregnant ewes abort (20%)
-excessive saliva from mouth (10%)
-bloody discharge from mouth (10%)
-lambs die (10%)
-ewes produce less milk (10%)

*Duration

-7-10 days (43%)
-15 days (29%)
-1 month (29%)

*Mortality
-few die (33%)
-around 25% of adult, and all lambs die (17%)
-around 30% of all sheep die (17%)
-50% of all sheep die (17%)
-few adult sheep die but approx. 50% of all lambs die (17%)

*All sheep get infected by the disease but in most cases young animals are more severely affected (50%), all are equally affected (25%), pregnant ewes are more severely affected (25%).

*Seasonality
-Rainy season (43%)
-Rainy and sometimes summer season (17%)
-Whole year (17%)
-winter season (17%)
-? (17%)

Haldariya
*cause (n=7)
-hot (43%)
-cold (29%)
-hot/cold, humide weather, change in weather (29%)

*symptoms (n=19)
-sheep produce red urine (79%)
-pregnant ewes abort (53%)
-sheep have yellow eyes (26%)
-sheep produce yellow urine (21%)
-sheep have no appetite (21%)
-faeses are abnormal (droppings are long in shape and look like “chewing gum”) (16%)
-fever (16%)
-diarhea (11%)
-ewes do not produce milk (11%)
-sheep appear to have pain in whole body (11%)
-sheep have a lot of gas i their stomach (5%)
-after sheep die of this disease their eyes are yellow (5%)

*duration (n=5)
-3-4 days (20%)
-6-7 days (20%)
-10 days (20%)
-15-20 days (20%)
-7-30 days (20%)

*mortality (n=6)
-some die, about 10% of all infected animals (33%)
-half of all infected animals die (33%)
-many die, over 50% of all infected animals (17%)
-sometimes all animals die, sometimes none die (17%)

*Seasonality (n=6)

-Rainy season (100%)

*(n=4)
-the whole herd gets the disease within a short timespan (50%)
-only some sheep get the disease (25%)
-sometimes only few and sometimes th whole herd get the disease (25%)

* (n=4)
-Only adult sheep get affected (50%)
-Small lambs are more severely affected (25%)
-All sheep are equally affected but adult animals get first infected (25%)

Fatgiya
*cause (n=18)
-sheep eat to much green fodder (94%) (33% of this 94% mentioned that this disease occurred during migration when there is lot's of green fodder available)
-change in diet (6%)

*symptoms (n=8)
- "sheep jump and die" (100%)

*duration
-seconds to some minutes (100%)

*mortality
-all animals die (100%)

*seasonality
-rainy season (more green fodder is available) (100%)

Mata
*cause (n=13)
-disease is caused by goddess "mataji", but also sick sheep can infect healthy sheep (54%)
-disease is caused by mataji (31%)
-cause not known but healthy sheep can get the disease from sick sheep(15%)

*symptoms (n=12)
-small lesions on body (100%)
-fever before lesions appear (58%)
-weakness, no appetite (42%)
-diarrhoea (25%)
-difficulty breathing (8%)

*duration (n=12)
-4-9 days (50%)
-7-15 days (25%)
-15-30days (17%)
-30 days (8%)

*mortality (n=12)
-90-100% dies (42%)
-30-50% dies (33%)
-60-75% dies (25%)

*Seasonality (n=12)

-all year (42%)
-winter (17%)
-summer (17%)
-rainy and winter (17%)
-rainy and summer (17%)
-rainy (17%)

*(n=10)
-mostly young sheep are affected (40%)
-all sheep get equally affected (40%)
-mostly ewes get affected (10%)
-mostly adult sheep get affected (10%)

*(n=10)
-the whole herd get this disease within a few weeks (100%)

Thakla
*cause (n=10)
-cause not known but healthy sheep can get the disease from sick sheep (20%)
-cause not known but lambs get it from drinking an infected ewes milk (42%)
-cause not known (10%)

*symptoms (n=17)
-swelling and pain in joints (100%)
-udder problems (e.g. no milk production) (65%)
-difficulty walking (47%)
-pregnant ewes abort (47%)
-ewes are weak, no appetite (35%)
-sheep get blind (24%)
-diarea (12%)
-fever (12%)
-sheep are anorexic (6%)
-mucus discharge from mouth and nose (6%)

*duration (n=4)
-5-6 days (in young animals)(25%)
-15 days (25%)
-1-2 months (25%)
-up to three months (in older animals) (25%)

*mortality (n=8)
-young animals always die (38%)
-some adult animals die (38%)
-of all sheep infected many die (25%)

*
-young animals are more severely affected (66%)
-pregnant and lactating ewes are more severely affected (33%)

-disease affects a whole herd

-lambs are first affected and die first (50%)
-adult sheep are first affected (50%)

Nimji
*cause

-? not asked

*symptoms (n=6)
-lesions on muzzle (67%)
-mucus discharge from nose (33%)
-lesions inside nose (17%)
-hair inside nose is gone (17%)
-sneezing (17%)
-small worms in nose (17%)

*duration
-several months

*mortality
-very few animals die with this disease

Appendix 5H Ethnoveterinary practices for most common sheep diseases

***Gogla (n=38)**
-"Teramacine" (Oxytetracycline injection) (29%)
-"Nilverm" Broad spectrum worm remedy for livestock and poultry (24%)
-"Elzen" dewormer for roundworms and tapeworms (24%)
-Albendazole, Broad spectrum anthelmintic for livestock and poultry (18%)
-Sheep are first given jaggery which is sweet and attracts the "disease causer" and then chili is given which kills the disease causer (16%)
-"Tolzan", liverfluke drench (13%)
-oil and turmeric is given (11%)
-mortuta is given (11%)
-hot iron is applied (8%)
-mortuta is mixed in water and given to drink (5%)
-jaggery is mixed with urine a given to drink (3%)
-Allum, turmeric and urine are mixed and given to drink (3%)
-red chili, tabacco is mixed with water and given continuously (3%)
-jaggery and turmeric is given (3%)
-allum is given (3%)
-castor oil mixed with water is given (3%)
-mustard oil, turmeric and water are mixed and given to drink (3%)
-tablets are obtained from medical store and given to sheep (3%)
-neem tree leaves are used to spread blessed water over the infected sheep (3%)
-tabacco and water are mixed and given to drink (3%)
-kira oil is mixed with water and given to drink (3%)
-tabacco, salt and water are mixed and given to drink (3%)
-ghee and boiled water are mixed and given to drink (3%)
-mortuta, tabacco and water are mixed and given to drink (3%)
-custard oil and two drops of technical oil (Carbon tetrachloride) are mixed and given to drink (3%)
-spirit medium is visited (3%)

Hindura (n=33)
-"Nilverm" broad spectrum worm remedy (42%)
-"teramacine" oxytetracycline injection (36%)
-Albendazole broad spectrum anthelmintic (18%)
-no treatment is given (12%)
-Tolzan, liver fluke drench is given (3%)
-hot iron is applied (3%)
-allum turmeric and buttermilk is mixed and given to drink (3%)
-mustard oil, boiled water and turmeric are mixed and given (3%)
-jagery and turmeric are fed (3%)
-castor oil and warm water are mixed and given to drink (3%)
-prayers/mantras (3%)
-allum, turmeric and water are mixed (3%)
-ghee and boiled water are mixed (3%)
-chili is mixed with ghee and put in nose of sheep to cause the sheep to sneeze, then worms come out (3%)
-allum powder is given (3%)
-morturta is given (3%)

FMD (n=39)
-smoke of burnt items of animal origin is spread in middle of sheep flock (33%)

-donkey hoof (31%)
-dogs' faeses (15%)
-jackal's faeses (15%)
-turtle shield is put upside down, filled with ghee and then lit (15%)
-turtles head is burnt (8%)
-lizard is burnt (8%)
-bird is burnt (8%)
-oil (ricinus or other oils) and turmeric are given to drink (26%)
-prayers/tantras (18%)
-oil is boiled and mixed with turmeric and put on wounds (18%)
-"teramacine" Oxy-tetracycline injection is given (13%)
-spirit healer is visited (13%)
-boiled oil is put on wounds (10%)
-Potassium permanganate is dissolved in water and applied on wounds (8%)
-"teramacine" Oxy-tetracycline is applied on wounds (5%)
-oil is given to drink (5%)
-kira oil is put on wounds (5%)
-ricinus oil, boiled water and turmeric are given to drink (5%)
-a tea is made from the bark of the karava tree (5%)
-mustard oil and salt are boiled and applied to wounds (3%)
-charcoal, salt, ghee and oil are mixed and applied on wounds (3%)
-boiled ghee is applied on wounds (3%)
-ghee and turmeric are given to drink (3%)
-castor oil, buttermilk and turmeric are given to drink (3%)
-ghee is given to drink (3%)
-holy water is collected from local temple and spread over sheep while saying tantras (3%)
-custard oil, water and turmeric are applied on wounds (3%)

Mata (n=39)
Treatment
-visit spirit medium (23%)
-no treatment available (10%)
-call veterinarian (8%)
-chanting mantras (3%)
-"nilverm" broad spectrum worm remedy (3%)
-small piece of tissue of infected sheep is collected and then put in ear of another infected sheep (3%)
Prevention
-Apply traditional vaccine (90%)
-avoid contact between sick and healthy sheep (60%)
-women in menstruation are not allowed near sheep (51%)
-healthy sheep are taken out of the village for 30 days when there is an outbreak (3%)

Haldariya (n=39)
-chanting of mantras and tantras (44%)
-flowers of *Butea monosperma* are used to make a tea which is given for several days (44%)
-spirit medium is visited (21%)
-"teramacine" Oxy-tetracycline is injected (8%)
-Animals are put in an open space or given a cold bath (cause of the disease is hot) (8%)
-bark of the karava tree is crashed and put in water, after boiling the mixture is filtered and given to the sheep (5%)
-jaggery is fed to the sheep (3%)
-turmeric and warm water are given to drink (3%)
-buttermilk and turmeric are given to drink (3%)
-custard oil and turmeric are given to drink(3%)

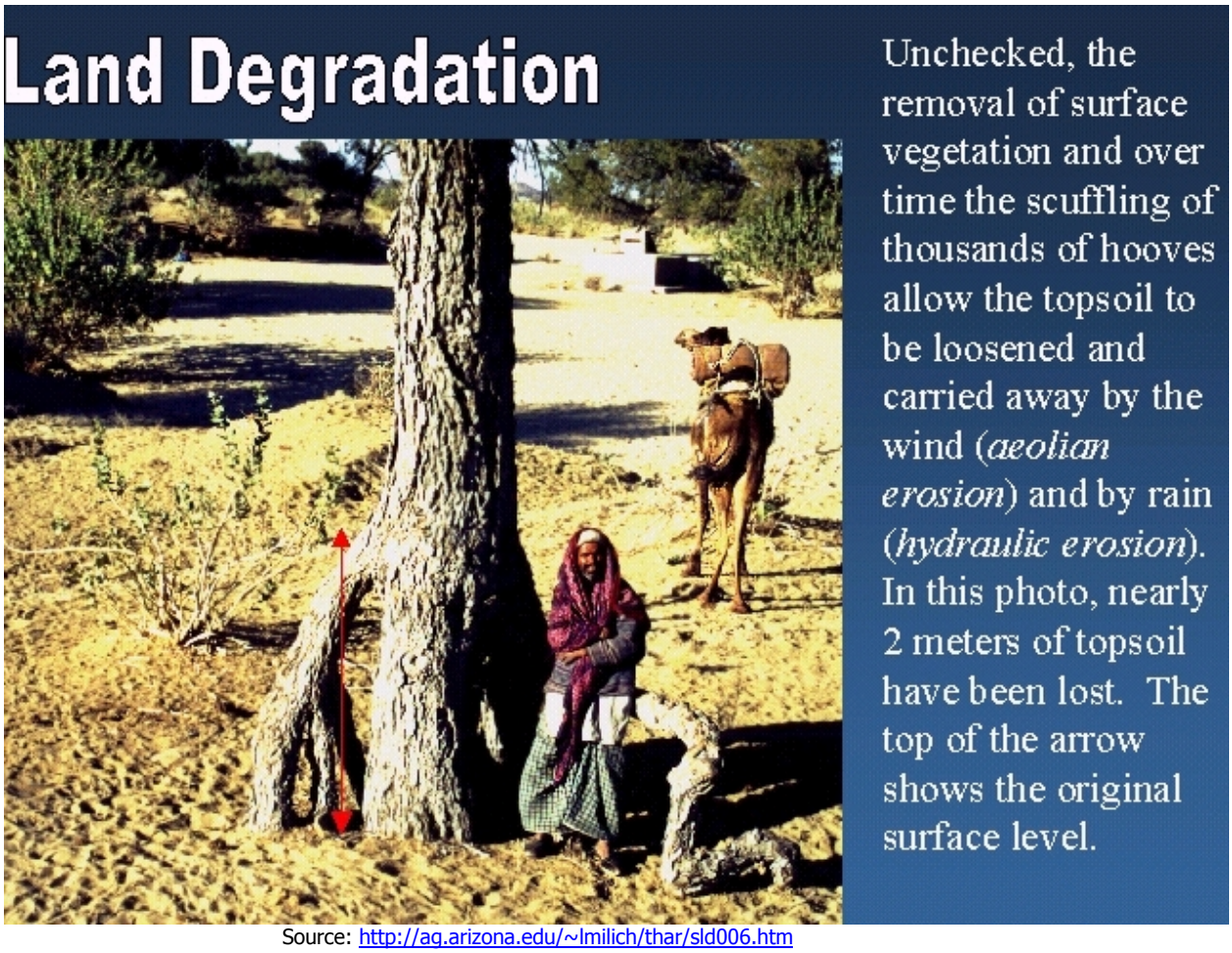
-mixture of jaggery and water is given to sheep (3%)
-obtain holy water from temple and spread on sheep (3%)
-go to temple for praying (3%)
-mortuta and water are given to sheep (3%)
-hot iron is applied (3%)
-“Nilverm” broad spectrum worm remedy is given (3%)
-neem tree leaves are used to spread blessed water on sheep (3%)
-piece of wood from “haldariya tree” is put in middle of corral (3%)

Nimji
-oil (tili, diesel, kurji) is put on wounds (92%)
-cactus milk is put on wounds (17%)
-acra leaves are crushed and liquid is used to apply on wounds (17%)
-some paste is obtained from medical store and applied on wounds (17%)
-water is mixed with kerosine and salt, this is applied on the muzzle (8%)
-ghee is put on wounds (8%)
-kurji oil and ashes are mixed and applied on muzzle (8%)
-pesticide is put on wounds (8%)

Thakla (n=39)
-bark of the karava tree is crashed and put in water, after boiling the mixture is filtered and given to the sheep (28%)
-oil and turmeric are given (26%)
-ricinus oil water and turmeric are given (10%)
-donkey dung is mixed with hot water, mixture is kept overnight than filtered and given to drink (10%)
-“teramacine” broad-spectrum worm remedy is given (8%)
-ajwain is given (8%)
-fish is boiled in water and then mixture is given to the sheep (8%)
-lizard is boiled in water ans mixture is given to sheep (5%)
-satiyanasi leaves are used to make a tea, this tea is given to drink (5%)
-bark of unidentified tree is used to make a tea from and given to sheep (5%)
-garlic is boiled in water and giveb to drink (5%)
-tabacco is mixed with water and put in a pot, this pot is berried in a dung heap for 3-4 days and then the mixture is given to the sheep (3%)
-go to temple to pray (3%)
-burning a donkey hoof in middle of sheep corral (3%)
-bark of Rohin tree is mixed with water and put in a pot, this pot is berried in a dung heap for several days and then the mixture is given to the sheep (3%)
-bark of karava tree is mixed with water and put in a pot, this pot is berried in a dung heap for 10 days and then the mixture is given to the sheep (3%)
-water, ghee and turmeric are mixed and given to sheep (3%)
-jaggery and turmeric are fed to sheep (3%)
-hot iron is applied (3%)
-Ajima powder is boiled in water and given to drink (3%)
-quarpata, boiled water and turmeric are mixed (3%)
-spirit medium is visited (3%)
-chanting mantras (3%)
-hot custard oil and turmeric is put on joints (3%)

Fatgiya (n=25)
-there is no treatment (40%)
-don’t know disease (12%)
-prevent disease by vaccinating before going on migration (12%)
-buy medicine when one sheep in flock dies of this disease (16%)
-buttermilk is given to sheep (4%)

Appendix I Land degradation



Source: http://ag.arizona.edu/~lmilich/thar/sld006.htm

Glossary of ethnominerals

Alum/alumen, local name Fitagri

Source **:** Alum earth of Nepal. Found with peroxide of iron in Silajit or Alum earth

Characteristics :Colourless, transparent, crystals with acid, sweetish astringent taste.

Action/Uses :astringent, haemostatic, antispasmodic, antiseptic.
Used in; haematuria, leucorrhoea, gastric and intestinal catarrh/diarrhoea and other haemorrhages

Charcoal (Carbo ligni)

Source **:**From burning wood.

Characteristics **:**Black moderately black lumps. Powder charcoal is black amorphous powder.

Action/Uses :Dry charcoal has the power of condensing oxygen, rapidly destroying organic Substances. Used in foul smelling diarrhoea

Copper sulphate, local name Mortuta

Source **:**prepared by roasting copper pyrites with sulphur, dissolving the roasted mass in water evaporating the solution to obtain the dark-blue crystalline sulphate**.**

Characteristics **:**Occurs as blue crystalline masses.

Action/Uses **:**In chronic diarrhoea, dysentery, and parasitic diarrhoea. In various forms of bleeding from mucus membrane, as mild lotion. To cauterise foul smelling Ulcers and footrot. It is used as a powder.

Glossary of ethno-animal products

Butter oil/ghee

Source **:**prepared by melting butter

Characteristics :white or yellowish semi liquid with aroma

Action/uses :Ghee is stomachic, nutritious. Alleviate of gas and indigestion. Generative of the secretion of semen and is beneficial in diarrhoea. Emollient soothing. Externally used on dry skin and irritability of skin. As ointment base

Butter milk, local name Chaach

Source **:**by churning curdled milk with water

Characteristics : white bluish fluid. Sour.

Action/uses **:**Rich source of calcium. Diuretic, cooling, acidic. Given as cooling agent in Diarrhoea and dysentery