

# HERDING KNOWLEDGE

Cameron McPhee, (2002). ADRA Mongolia.

A combination of severe drought and cold, known as the dzud, occurs periodically in Mongolia. Two successive dzuds in 2000 and 2001 killed a great number of animals and adversely affected the reproduction of the survivors. The herders suffered severe hardship and the economy of the whole country was badly affected.

This booklet documents the traditional methods, experience and skills used by the herders to manage these calamities and was the outcome of ADRA's (Adventist Development and Relief Agency) project "DZUD" in cooperation with the Animal Husbandry and Irrigation Department of the Ministry of Food and Agriculture and funded by the Embassy of the United Kingdom. The booklet emphasises the care and herding of the so-called "small cattle" (sheep and goats).

The correct management of grazing animals is the harmonization of land, pasture, salt marsh and water for each kind of livestock. Whenever and wherever pasture is chosen for livestock, special attention should be paid to the following:

- season
- numbers and kinds of livestock
- geographical features
- species of plants in the pasture
- amount of plant material present
- suitability of the plants for the livestock present.

## SPRING

Judge pasture quality in the spring by the strength and appearance of the livestock grazing it. Even though the yield of grass looks good and the so-called "large cattle" (horses, camels and cattle) become fat, the "small cattle" (sheep and goats) may not. Days become longer and the weather gets warmer in the spring but the nutrient value of pasture plants continues to decline and there is also a reduction in the quantity available. This is why most animals in spring lose 25-30% of their fatness gained during the fall and winter. In a dzud year however they can lose 35% of their condition during the spring. When this occurs, urgent action is needed.

First priority in spring is the care and management of the newborn animals. Carefully manage the sharing of pasture between different classes of livestock. Graze mothers with offspring on new pasture close to the house. Graze livestock without offspring a little further away and sheep and goats that gave birth early in the season even further from the house where grass is new, so that they can regain their condition.

In windy and stormy weather, livestock are more settled on the south side of high mountains in rough shallow gullies. Sheep and goats thrive best where there is moisture which promotes the early growth of grasses and herbs in early spring. When the weather gets warmer and females have finished giving birth, young animals will become stronger and fatter if they are grazed where wormwood, wild leek and khomuul grow well.

There is greatest need for drinking water in summer but the strong winds and storms of spring also result in drying and reduced nutritive value of pasture. To stimulate appetite and thirst, give salt marsh or salt every day to animals that are spending spring time in the mountains.

Livestock that lack water give little milk and are too slow to get fat and strong and to grow wool. Even though land, pasture and livestock management is good, animals that have just given birth lose weight easily during spring dust storms. Therefore ensure that animals that have just given birth have a plentiful supply of water and fodder available at this time.

Take care with the selection of spring living quarters. An ideal environment would be at the foot of a mountain range which blocks wind and storm but not the sun in the evening: a sheltered, slightly sloping, low area with good pasture, water and salt marsh.

In the region of forest and steppe, settle on the bank of a river where willow, broom grass and reeds grow. In the forest and mountains, the best areas are where plants such as wormwood, botuul, urheg, hiag, tarvagan shiir, shuvuun khol, wild onion, anemone, and zultargana sharilj grow. Good pasture on the steppe would also include, in addition to the above, khazaar, khargana and budargana. In the gobi, the best pasture would have mongolian herb, botuul, khyalgana, khazaar, tsagaalj, shavag, budargana, wormwood, bojmog, teseg bagluur, sharilj and wild leek. Within all these areas the best land is sheltered from the wind.

### **Revitalising weakened animals with supplements**

Feed exhausted livestock a supplement early, particularly if the weather is bad and the pasture deficient. Such livestock need to be kept under constant observation. Otherwise the number of exhausted animals will grow. If you give too much food to exhausted animals they may suffer diarrhoea or constipation. Feed such animals gradually for the first three days.

Livestock that have been fed all their lives on pasture are not used to being hand fed. First, give them green grass, then mixed fodder soaked in a bran or wild leek and khomuul infusion. The livestock then become docile.

A supplement has a different action before and after feeding. A supplement before feeding increases appetite but after feeding it helps digestion. Continue supplementing animals until they have recovered. Muzzle healthy animals to prevent them eating and wasting the supplement.

Some supplements are used for strengthening and activating the digestive organs of weakened livestock. Typical home mixed supplements can be made as follows:

**Grass supplement:** Give 500g-1.5kg of green grass to small cattle and 3-5kg to big cattle that are at risk. To increase the power of the supplement, 5-6 hours before it is fed, put it in a bucket, a basin or a manger and soak it well with hot water and season it with salt. Then give 200-300g of the mixture to sheep and goats and 2-3kg to big cattle.

**Mineral supplement:** Give hard salt or salt marsh in crumb or in solid form to livestock as a lick. Each day give 5-10g of salt to small cattle and 15-20g to big cattle. Provide the salt marsh in the animals' pen so that they can lick the salt any time.

**Infused white food:** Reduce 3 litres of milk to one litre by boiling over a low fire. Put 2-3 spoonfuls of the liquid into 5 liters of warm water and stir. Give 200g to small cattle, 250-300g to a calf in its second year and 500-800g to big cattle before feeding them.

**Onion decoction:** Cut up 10 bulbs of onion and put them in 10 liters of hot water and add 500g of mixed fodder.

Put the mixture in a vessel with a lid and keep it in a warm place until next day. Give 100-200g of it to small cattle and 500g-1 liter to big cattle.

**Herb infusion:** Add 6-7 liters of boiled water to 1kg of short cut grass, seal the container and keep it in a warm place for 1 day then filter it. Then warm up the fluid and add 5-8gr of salt per liter of the fluid. Before pasturing or feeding give 400-500g of the fluid to small cattle, 1.5-2liters to big cattle and 500g-1liter to calves in their second year.

**Flour gruel:** Add one cup of flour to 4 scoops of cold water and heat the mixture until it boils. When cool, give 800g-1 liter daily to small cattle before pasturing or feeding them and give 1.5-2 liters to big cattle. This is extremely good for settling the lining of the stomach.

**Fluid from soured milk:** The fermented milk of mares and the fluid from sour milk improve the activity of the liver and regenerate the blood. They also make peristalsis in the stomach more active. 100-200g of the fluid from sour milk should be given to small cattle and 500g-1 liter to big cattle daily before they are pastured or fed.

**Meat soup:** Put some curds from sour milk and millet in soup made from horse meat and beef and boil it. Then, give 200g daily to small cattle and 1 to 1.5 litre to big cattle. Always warm the soup before feeding it to livestock.

**Livestock liver:** Liver is rich in protein, carbohydrate and vitamins. Cut liver into small pieces and mix it with salt and give 50g of it to each animal. Alternatively, mix 2kg of millet, 500g of edible oil, 1kg of wild leek, 1kg of livestock liver, 500g of salt, 1kg of horse or marmot oil in 10 liters of water. Give 20g or 1 spoonful to small cattle and 30-50g or 2 spoonfuls to big cattle twice per day. Ensure the liver is free of infectious disease before feeding it to livestock.

**Flavored water:** Put 1 kg of wild leek and 500g of plant leaves into 10 liters of warm water and give it to animals instead of water after they have eaten fodder.

Weakened livestock are liable to collapse if they are suddenly given free access to plenty of food and water.

When the weather is poor and food is scarce, give the animals free access to salt. Giving them warm salty water to drink will improve the digestibility of feed by 15% to 30%.

Give the weakened and exhausted animals warm bedding and lift them up periodically to relieve their stiffness.

**Artificial protein:** Put 1-2 spoons of horse or marmot oil and 3 eggs in 1 liter of milk and stir the mixture thoroughly. Give one scoop of artificial protein to a calf and a cup of protein to lambs and kids not less than 3 times a day. For newborn animals dilute the mixture with a cup of boiled water.

**Artificial milk:** Put a small cup of powdered milk, a spoonfull of oil (horse, marmot oil or melted butter ) and 1 spoonful of salt in 1 liter of water and boil it. Give a medium sized cup of the mixed milk to lambs and kids and half scoop to a calf.

**Mixture for feeding baby animals from a bottle:**Mix a small cup of powdered milk, 1 scoop of flour, a medium sized cup of bran and 1 spoonful of salt together. To 1 cup of the mixture add 1 liter of water and boil it. Give warm 2-3 times a day to newborn young animals of the small cattle. First give one small cup then increase to a full cup. Give the artificial milk and the mixture to baby animals from a bottle after warming them by wrapping them in a coat filled with cotton under the belly.

### **Sheltering livestock**

It is correct practice to graze livestock against the wind but sometimes animals which have just left their corral do not want to go against the wind so move them downwind for a while, then drive them back against the wind. In this way livestock can be moved to pasture by making them go under each other's shelter. If a strong storm starts suddenly while livestock are grazing, then drive the small cattle, keeping them together, to the nearest corral downwind. If there is a need to drive cattle against the wind to a corral, drive big cattle first with the small cattle following them. Sheep and goats can also be led to shelter by a horse pulling grass behind it. Drive livestock to a corral through sheltered areas such as forest, grove, rocky mountains or ravine which are close to the corral. Whichever route is taken to approach shelter, livestock may still stray during a snowstorm and cold rain.

Guide them to their shelter at night with a light. The battery of a car or a motorcycle can be used as a source of power. Livestock remain still when they hear a sound at night. Place lanterns and lamps around around the shelter. This will also help to give heat. Be aware that livestock can become blinded by frost causing them to stray from their shelter.

A stallion tied up in a sheltered place, will attract a mare and colts to stand with him and so gain shelter. Places where the pasture is better than average and where horses graze in isolated groups (otor) are suitable for siting shelters. Individual or small mobs of horses will not enter a river in a strong snowstorm but large mobs will force each other into a river and some may drown. When horses

move downwind because of a strong storm and toward a river or a lake, divide them into small groups to prevent this happening. When occupying otor land, make the space between gers into a shelter by erecting fences. Disturb livestock in a corral to prevent them becoming covered in snow during a storm. Brush the snow off the backs of sheep and goats in a corral with a piece of cloth tied to a stick or get other animals to eat grass sprinkled on their backs. Avoid suffocation during snowstorms by penning animals in small groups and improve the survival of young by forcing their mothers to stand and suckle them.

Allow livestock to finish ruminating before moving them to pasture. They stand up when rumination is finished. Allow cattle to follow their preference for grazing at night. Gather scattered male and barren cows to the center of the herd for grazing so they can be fattened for slaughter.

## **SUMMER**

The extent to which livestock become fat in summer has an important bearing on their chances of survival in the winter and fall.

In summer sheep have been found to walk an average of 6-8 km in a circle and graze 14-15 hours a day. A fat sheep eats 3.5-4.5kg of grass and a tolog ( last year's lamb ) eats 2-3kg, while a 5-6 month lamb eats 1-1.5kg of grass per day and gains, on average, 200-250g. When choosing pasture in summer time, choose rather cool land where many kinds of plants grow and a stream flows and which is located far from the winter and spring camps. In the beginning of summer, animals grazed on pasture with snowdrops gain strength and fatness quickly. In the middle of summer elevated areas are best as they tend to be cooler and have fewer flies and mosquitoes.

Rest livestock on pasture at noon and move them in the afternoon until they come to rest. This is where they should sleep and feed overnight. This procedure minimizes fatigue and maximizes the time spent in productive grazing. Separate lactating sheep and goats from non-milking stock and graze them in the nearest otor. Then pen the mothers nearby for convenient milking and the lambs and kids near the closest neighbor's house. Alternatively put the lambs and kids with the sheep and goats that cannot be milked. Once the milking period is finished, combine the two groups of sheep on otor.

In dry summers the best pasture is on areas of damp soil with deep rooted woody plants and spring water. In the forest and steppe zones, the best pasture has plants such as wormwood, khiag, bojmog, budargana and khers. It also has springs and ponds with some salt marsh. In the Gobi region, the best pasture has plants such as mongol herb, khazaar herb, yorhog, botuul, bor taar, khargana, budargana, teseg, togtorgono and bor elgene.

In the high mountain regions of Altay and Great Concave Lake, the best grazing lands have the plants yorhog and khiag. From the end of June until the end of August, the high mountain ridges with permanent

snow grow useful pasture plants such as hurgan chikh, tarvagan tagnay, uurgene, daagan suul, botuul, yorhog and ulalj.

The best time for haymaking is between the middle of July and the end of August. If mowing is earlier than this, yield can be depressed by up to 40% or if mowing is later, yield can be depressed by up to 30%.

## **FALL**

### **Selecting land and pasture**

Fall is the most important season for livestock to put on weight and increase their strength and fatness.

In the fall, the most productive pasture is to be found where grass and plants wither late and there is well watered lowland where botuul, wormwood, dagsh, teseg, unegen suul, tarvagan shiir and beans grow. In mountainous areas which get cold early, it is usually not possible to find "sol" (grasses which remain green throughout the fall).

In addition to seeking sol on which to graze animals in late fall-early winter, look for other types of pasture which will retain the fatness of livestock into winter. If sheep had grazed Khangai ( a hilly and forested country with a cool climate ) and put on weight, transfer them to a lowland pasture where plants such as wild leek, wormwood, wild onion, budargana, bor taar and khomuul grow.

In the Gobi region, land which should remain productive until the end of the next spring typically includes wild leek, khomuul, wormwood, wild onion, hiag, budargana, bagluur, sharilj, brown and white shavag and tsagaalj. Suitable also would be a pasture where mainly wormwood, khers, wild leek, wild onion and tarvagan shiir of the mountain meadow grew.

The strength and fatness of livestock can be increased if they graze khers when it becomes brown, the heads of wild onion, khomuul and wild leek when they turn yellow and dry up, the "sol" of bagaluur and brown and red budargana cut when they are juicy and have a green heart. Well fed sheep move slowly and like resting calmly. They grow in the corral at night as they stretch their legs.

### **Conserving strength and fatness**

Carefully study the condition of the land and manage the herd quietly so they become placid and easy to move in the cold. Minimise restlessness and carefully estimate the ability of the animals to withstand the winter by judging their fatness and strength.

In the fall, graze livestock from early in the morning until the stars appear. The optimum conditions for them include grazing them on a high terrace where the soil is deep, into a gentle headwind, particularly in the morning. Livestock will perspire when they walk a long way but if they are herded carefully, they will not lose their fatness and strength, particularly under a routine of taking them to pasture in the morning when they are hungry and back to a corral in the evening after they are full. Do not frighten or startle livestock because unnecessary

activity causes fat small cattle to perspire easily and lose their fatness quickly. Fat, strong and replete livestock also like to play and run and may injure themselves and others.

Livestock usually drink more water at the end of the fall than at other seasons. They will withstand the cold better if they drink cold water from the nearest spring rather than driving them to a stream with warmer water. Take greater care with small cattle than with large cattle as they are more sensitive to stresses.

Postpone moving livestock to their winter quarters until after the first signs of winter because animals moved to shelters too soon, lose condition. Salt marsh is valuable for improving and keeping livestock fat and strong. Carry it to feed to livestock in the Khangai and steppe region where salt marsh is rare and keep it in the corral at all times. Sheep show the following signs of their readiness to move to winter camp:

- lying in very close contact with each other
- getting up early and standing while suffering from cold
- lifting their legs
- getting frosted over
- shaking themselves

Make sheep and goats lie on outlying areas of the manure of their winter quarters. They can then easily be moved out to graze during fall if there is a spell of warmer weather. The dates of entering and leaving the winter camp should not be fixed but judge it by the prevailing weather conditions and the strength of the livestock. If the land and the pasture suit the livestock they will:

- be stable in their pasture,
- have slow movement,
- appear to have short legs when looked at from afar and
- have a glittering and yellowish appearance

Signs, such as hair and wool turning black and falling out because of humidity and restlessness are indications that the pasture and the livestock are not suited to each other.

## **Reproduction**

An important aspect of successful livestock herding in the fall is reproduction. The most important consideration is the choice of sire.

**Selecting a sire:** A dam ( the mother of an animal ), on average has 6-12 offspring in her lifetime by giving birth once a year.

Through natural mating, a sire (the father of an animal) can produce 25-50 offspring a year, that is, 250-500 in his lifetime. If artificial insemination is used, a sire can give birth to many more offspring.

When selecting a young male as a sire, pick out an animal which is strong enough to survive and produce many offspring in the hard Mongolian

environment and also has offspring which have the good characteristics of strength, fast growth, and the capacity to produce many offspring and much meat and wool.

The ability of the male himself to survive and reproduce can be easily judged from his own characteristics. These include good size for his age, mobility and sound reproductive organs.

The ability of the male to sire productive offspring is more difficult to assess. His own appearance may only reflect his upbringing but not his genes which carry his characteristics to his offspring. For example, he may be larger and stronger than other males simply because he is older or was born in a better year. If this is the case he will not necessarily have superior progeny. To predict the quality of the future progeny of a certain male, compare him only with other males that have had a similar upbringing (e.g. same year of birth, same age of mother, single or twin). This necessitates the individual identification (e.g. by numbered ear tag) of all males likely to be considered as future sires. Use this identification also to avoid matings between related animals which can give inferior animals.

Desirable characteristics of both male and female breeding stock include:

- a large size for age,
- a heavy white fleece with a fine fibre and
- a high rate of twinning.

After using a ram or a male goat for 3-4 years, introduce a new sire from an unrelated herd or family.

It is important to choose a sire whose relatives (parents, brothers and sisters) have performed well under the local pasture and weather conditions.

Assess males to be selected as sires in three stages: first selection is when a lamb is 1-2 months old, second selection when the lamb is weaned from its mother. The third and most important selection is when the animal is 12 months old.

Identify lambs individually (ear mark or tag) so that records can be made throughout their lifetimes of their growth, number of offspring etc. Use these records for the selection of parents of future generations of breeding stock.

**Methods of mating small cattle:** Small cattle can be mated naturally or artificially. Natural matings can be by one or a number of males in an uncontrolled way within the flock or can be controlled by joining a male with one or more specific females in a corral. Artificial mating is a process by which semen is collected from a male. It is then transferred by syringe to several females on heat. The main benefit of artificial mating is to produce many offspring from a very good sire. Technical knowledge is needed to carry out this type of mating and it may not be useful for many herders.

For both natural and artificial mating both the male and the female need to be in good condition to produce offspring.



Female sheep come on heat and matings are most successful if they are moved to a good pasture just before the mating period. Good pasture plants are wild onion, tagsh, wild leek, bojmog, budargana and sharilj.

Pay special attention to grazing and herding of rams and male goats during mating. Feed and water them well. Otherwise their mating performance will be impaired. Join all male sheep and goats with their female mates at the same time. Then, their offspring will be born at about the same time. Plan to have them born around the middle of June. Although sheep and goat mothers become disturbed when they give birth at the same time, their lambs and kids are not affected. If possible, keep a record of the identity of the sire used and date of each mating. The numbers of females to mate with each male are given in the table.

Species	Females per Male
Camel	20-25
Horse	12-15
Cow	25-30
Sheep	30-35
Goat	35-40

When males are left with the females all the time, offspring are born outside the normal birth season and to mothers which, because they are too old or too young, produce small and weak offspring. If male and female lambs and kids are not castrated or removed from the main herd at an early age, they too may sire unwanted offspring.

## **WINTER**

In winter herders face such hardships as severe cold and strong winds. The quantity of pasture plants falls by 40-50% and its nutritional value by 40-70% in winter. On cold winter days, livestock expend much of their energy in maintaining their body temperature, searching for pasture and warming the snow they eat and the water they drink. Their food intake cannot balance this loss of energy with the result that they have to draw on their reserves of fat and muscle and so lose condition. In the winter, graze sheep and goats when the sun reaches the pasture. To prevent the trampling of valuable pasture, move the herd slowly in small groups to the area to be grazed that day.

If the weather is dull and there is a likelihood of a strong and cold wind springing up, move the livestock closer to home where the grass is shorter and graze them gradually towards a corral as the weather worsens.

After moving to winter pasture first graze the most remote pasture and that which is most likely to be covered in thick snow as winter advances. The best pasture for both early and late winter, if there is sufficient available, is that on the steppe and in the valleys.

Measures to be taken for thin cattle when it is cold and windy include grazing them near the ger, giving them extra feed, covering them with blankets and bagging their horns. Graze exposed situations, such as open plains and the windward side of mountains in the morning and early afternoon before the wind gets up later in the day. Then move the animals to a sheltered place.

Water animals about the middle of each day. By that time the animals have eaten their fill and the water has warmed. If there is snow lying, animals need only be watered every other day.

When preparing for winter, make hay and conserve fodder, satiate the animals by adjusting the grazing and providing salt and a warm comfortable resting environment.

### **Selecting pasture**

Assess the nutritional value of pasture in the winter time on the appearance of plants. There is variation between years and species in the degree to which their nutritional value is retained into winter. Plants such as shavag, bodnuur, uerhog and botuul keep their value well. The feeding value of plants is considered to be good if they burn to a black ash. If the ash is white, the value is considered to be poorer. If the roots are green from plants such as hiag, uerhog and sogoovor that grow tall, it indicates that the value of the plant is good and the sol (grass which has remained green during the fall) has not stopped growing. If the plant tastes pungent, its value is good. Winter dried pasture has good value if the grass leaves and stems are thick rather than thin and the plants have a reddish orange rather than whitish orange colour. Layered plants dry to a lightish colour and legumes to a brown colour. The pasture with dried and thick grass is most nutritious and palatable for livestock in winter.

### **Selecting winter and spring camps**

When building a winter shelter for livestock, the correct siting is most important for long term use and maximum weather protection. Prime considerations are the terrain, the botanical composition of the pasture, the availability of salt marsh and water and the proximity of pasture to winter and spring camps.

The best place for winter and spring camps in the forest steppe is where:

- the hours of sunshine are long,
- there is least frost and wind,
- snow and snowdrifts are rare and
- the pasture is on healthy soil with water and salt marsh nearby.

In the gobi and steppe region the best place for winter and spring camps are:

- a ravine with feather grass and bushes,
- a sheltered area with many remote hills and a rare occurrence of frost and strong winds and

- a pasture with water nearby.

A reasonable distance to water for small cattle is about 3-4km. The distance between pastures of winter and spring camps should be adjusted so they do not overlap too much. Build winter and spring camps in the warmest places. In some areas, set up winter and spring camps where horses choose to spend their nights. The best place is a clearing in the forest or a lowland that is close to a forest on the southern slope of a mountain or a hill, away from river ice.

Sloping land is considered suitable for a corral, as the manure is moved downhill by the walking livestock.

Inspect the site after a blizzard to determine the best place to build the shelter.

Take time in summer to choose the best site for a winter camp.

### **Recovering livestock frozen and covered in snow**

Do not rescue snow covered sheep and goats by digging down from above. Dig them out instead from the side. Once removed from the snow, wrap them in a blanket and massage their limbs to restore circulation. If they are then moved to a warm ger or shed they should recover quickly.

Livestock that have been buried under snow for a long time lose a lot of fluid. Once they regain consciousness, give them water with salt, sugar, black tea, infusion of plants and nettles, artificial juice and gruel etc, a little at a time. When their jaws unfreeze, feed them on mixed fodder and bran. Frozen animals also respond to two spoonfuls of vodka.

They also recover quickly if they are wrapped in blankets and put in a shed and covered with manure with only their mouths and noses exposed. There is a record of a herder digging a hole down to sheep trapped under snow. The sheep were fed through the hole which was otherwise covered with a board. When the weather improved the sheep were released through the hole. Strong and fat sheep generally withstand being blown downwind and becoming exhausted in a storm.

### **Preventing burial of shelters under snow**

Build structures such as a fence, pen and shed 10 to 15 metres apart with three or four barriers of snow and stone surrounding each. Atop each shed put 3 or 4 flags 5 to 7 metres apart. In front of each shed drape a heavy curtain, weighted at the bottom. Block gaps and holes in the wall of the shed. Hay bales on edge can also be stacked to the height of the shed to block the wind.

The windward barrier can be a series of pens, connected by a fence, where fodder is stored. Inside this fence is a second one where hay is also stored and inside this is a third barrier where weak animals are fed.

In winter, pile bedding manure up to prevent it freezing when the sheep are out grazing. Spreading the manure before the sheep return to the corral will release heat and prevent the bedding freezing.

If horses or big cattle are driven across pasture that has been hardened by thick snow, small cattle are better able to utilize it. Sprinkle sand or ash on snow clad

southern slopes. This increases the absorption of heat leading to earlier melting of the snow in the spring.

### **Protecting the fetus**

The gestation period (length of pregnancy) of sheep and goats is 5 months. The most critical time for the goat and sheep fetus is the period starting 1 to 2 months after fertilisation. At this stage the fetus weighs about 80g. This compares with 5kg at birth. Livestock require special care in the 2<sup>nd</sup> to 5<sup>th</sup> month of gestation. At this time pasture and salt marsh are getting scarce, leading to an increased risk of abortion as they settle into their winter camp.

Adopt a pasture changing strategy in winter and spring according to the stage of pregnancy of sheep and goats. First use pasture on rough terrain with rocks and gullies and as the stage of pregnancy progresses move to more sheltered lowland areas where the chances of falling are less.

It is better to graze small cattle into the wind in cold weather since grazing downwind opens the hair and wool allowing the cold air to contact the skin. On a cold day keep the flock together and within 2 to 3 km of their shelter.

It is important not to alarm or frighten pregnant livestock and do not graze them in areas exposed to cold winds such as on the top of a mountain where there is likely to be thick and hardened snow.

The condition of pregnant livestock needs to be conserved by good husbandry as the developing fetus places increasing demands on its mother as it grows. Do not return the animals to their corral if signs of exhaustion are observed. By separating the pregnant females from the rest of the herd, give them special treatment such as additional fodder and the best pasture near their shelter. This should be spacious to avoid alarm, jostling and crowding.

Suitable pasture for pregnant small cattle would include new botuul, wild onion, soft hargana and blue. Pregnant livestock will abort their fetuses if they drink or eat after several days of being deprived of water and eating only dry spring pasture. Retained placentae after birth can also increase if small cattle have not had sufficient water during pregnancy.

Water small cattle in the afternoon after the frost has gone. Care is needed so that they do not slip and injure themselves on the ice. Spread sand and gravel in front of the trough to prevent slippage whilst drinking. It is also best to water them in small groups.

### **Feeding a mother which fails to give milk**

Females which do not produce milk after giving birth should be placed in a shed and their diet should be supplemented. The following have been found to stimulate milk production:

- a drink of warm water with salt and black tea taken 3-4 times a day with fodder of high quality.
- millet in black tea cooked with soup of meat and bone Give one cup to small cattle 2 times a day , and to big cattle 2-3 times a day.

- gruel of mixed fodder, bran and ground rice with sugar and some form of protein.

In addition to feeding these supplements to the mother, have her offspring suckle her 2 to 3 times a day and gently squeeze her udder by hand.

**Feeding a newborn offspring of a mother without milk.** In particularly severe winters, mortality among the new born is considerably increased. This is particularly so among the offspring of one year old mothers who usually have depressed milk yield under these conditions. Allow the mother to lick and clean her new born offspring as this promotes blood circulation of the young animal and the removal of the placenta from its mother. Suckling the mother soon after birth will supply the young with an irreplaceable supply of colostrum, a highly nutritious fluid which also carries protective substances (antibodies) from the mother.

If a mother fails to milk, allow the new born lamb or kid to suckle another mother which has given birth at the same time. In that way it will get some vital colostrum. At other times it can be bottle fed milk made from powder or cow's milk. Allow a baby lamb, fostered on another mother, to suckle her three times per day. It should also suckle its own mother to establish the mother-offspring social bond.