Adapt Recommendations to Local Circumstances

It is important to analyse the type of animal husbandry used within a family or community, as well as the local circumstances at hand, before embarking on activities in support of the animal husbandry practices. Because of the differences in objectives between systems, as explained in the previous chapters, it is necessary to adapt the recommendations similarly. This will be done for more specialized animal keeping systems in this chapter. The improvements of low-input and diversified systems are discussed in Chapter 9. The aspects related to marketing will be detailed in Chapter 11.

As indicated in the previous chapters, most livestock-dependent limited resource people can be found in the low-input and diversified smallholder farming and pastoralist systems. In addition, the same family may be employing a more specialized type of animal production of one selected species. This more specialized system will have a lower input level than large-scale commercial farms or ranches, but the logic of this livestock-keeping system—in terms of productivity focus—coincides more with the high-input commercial livestock keeping than with low-input and diversified farming.

Main Goal: Increased Animal Productivity and Farm Efficiency

In more specialized production systems, the intensity of inputs, labour and other costs are increased when compared with low-input and diversified livestock-keeping systems. Production per animal is normally higher and mortality is generally lower than in low-input and diversified livestock keeping. The more specialized smallholder livestock-keeping systems can be improved with the goal of increasing animal production and farm efficiency within the integrated agricultural system (van’t Hooft, 2004).

In Box 10.1, the main reasons for mortality in low-input and diversified and more
specialized systems are shown. Because of different management of the animals, they show some remarkable differences.

The ways to support more specialized systems are shown in Fig. 10.1 and are based on the recommendations to reduce mortality for supporting low-input and diversified systems, as mentioned in Chapter 9. These are the minimal requirements. This chapter explains the extra recommendations for more specialized livestock-keeping systems. Please note that this is an overview of possibilities of improved management practices rather than a complete guide.

### 1: Improved Animal Nutrition

Upon making the change from low-input and diversified to more specialized animal husbandry, the first thing to change, generally, is animal nutrition; both the quantity and quality of feed needs to be improved to maintain an adequate level of nutrition throughout the year. Dry and wet seasons make less difference in nutritional support than in low-input systems. The aim is to provide an optimally balanced feed ration from commonly available nutrient stocks, including grains, silage, hay and supplements. The ingredients are either grown on the farm or purchased through area markets.

Producers all know that it is very difficult to provide completely adequate nourishment throughout the year, especially for families that have recently changed from diversified husbandry to more specialized husbandry. To assure good management of the animals requires continuous investments of capital and labour, which is not always easy to guarantee. Moreover, at the beginning of the process of change from one system to the other, families are insecure about their debts and how to access new markets. At this period these families need extra support.

The recommendations for animal nutrition in more specialized livestock keeping are divided into two parts: (i) dry season nutrition; and (ii) mineral supply.

#### Dry season nutrition

Good-quality animal nutrition year round may well be the most challenging factor for more specialized livestock keeping for all producers. For low-input systems, the nutritional objective during the dry season is to reduce mortality and weight loss. This is done by taking advantage of available fodder stocks, such as straw from grain crops, leguminous trees and other agricultural by-products.

These strategies that are described in detail in Chapter 9 can be maintained and improved in more specialized systems:

- Improved straw storage and feeding;
- Supporting local feeding innovations and traditions;
- Improved use of kitchen leftovers;
- Green forage, such as oats, barley and lucerne;
- Hay making;
- Cheap and easy to obtain by-products, such as wheat bran;
- Use of feeder troughs.

---

**Box 10.1. Main causes of mortality and loss in low-input and more specialized livestock-keeping systems.**

<table>
<thead>
<tr>
<th>Low-input systems</th>
<th>More specialized systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional deficiencies, especially during dry periods</td>
<td>Infectious diseases</td>
</tr>
<tr>
<td>Lack of pasture</td>
<td>Acute conditions new to the farmer, such as milk fever</td>
</tr>
<tr>
<td>Water deficiencies</td>
<td>Birthing difficulties because of offspring with big size</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td>Acute udder infections (mastitis)</td>
</tr>
<tr>
<td>Internal and external parasites</td>
<td>Culling because of infertility, lameness or injury</td>
</tr>
<tr>
<td>Breeding deficiencies</td>
<td></td>
</tr>
<tr>
<td>Lack of protection</td>
<td></td>
</tr>
<tr>
<td>Lack of care in special moments (birth, illness)</td>
<td></td>
</tr>
</tbody>
</table>
Fig. 10.1. The wheel of animal well-being and production for more specialized livestock keeping, showing the eight major areas of improved management in more specialized animal keeping. They build on the minimum recommendations for low-input livestock keeping.

Additional feeding strategies in more specialized systems are described below.

**Lucerne with irrigation**

Lucerne is a high-quality legume that can be used to feed the animals throughout the year. Different varieties of lucerne are used depending on the climatic and soil conditions in each area. Lucerne requires irrigation during the dry months, and is therefore a crop that requires relatively high input. Because of its quality, it is a well accepted crop in many regions of the world. It is mostly used in cut-and-carry systems. In some cases, lucerne is used in controlled grazing, though the crop does not resist heavy grazing.

**Elephant or Napier grass**

Fodder crops are often planted in the case of initiating a zero-grazing system. In this case (Fig. 10.2), the Napier grass is best planted as
Table 10.1. Comparing objectives and recommendations for improved animal nutrition in smallholder low-input and diversified livestock keeping (with more specialized animal husbandry).

<table>
<thead>
<tr>
<th>Animal nutrition</th>
<th>Objectives</th>
<th>Dry season nutrition</th>
<th>Mineral supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified systems</td>
<td>Reduced mortality in dry season</td>
<td>Agricultural by-products storage and feeding</td>
<td>Provide ordinary salt</td>
</tr>
<tr>
<td></td>
<td>Reduced weight loss</td>
<td>Support local feeding innovations</td>
<td>Home-made mineral blocks</td>
</tr>
<tr>
<td></td>
<td>Increased resistance to drought</td>
<td>Plant leguminous trees</td>
<td>Vitamins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improved use of kitchen leftovers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green forage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hay making</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feeder troughs</td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td>Holders and other minerals</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td>More specialized systems</td>
<td>Better nutritional status year round</td>
<td>Improved reproduction rate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improved stock</td>
<td>Special feeding of young stock</td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td>Holders and other minerals</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vitamins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vitamins</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 10.2. Feeding with elephant grass in a zero-grazing unit.
close to the zero-grazing facility as possible. This reduces labour in transporting the materials.

If the fodder grass is planted in rows, a shallow trench in between each row can facilitate watering. Manure from the pens can also be used in these trenches to fertilize the grass.

A way to judge the amount of land needed for one cow is the following. About 0.4 ha (1 acre) of Napier grass is enough for each local dairy cow per year in most areas. If the Napier grass is intercropped with Desmodium or other legumes, 0.3 ha (0.75 acre) is enough for one cow; 0.4 ha of Napier and Desmodium is enough to feed a cow and a calf. Other local grasses can be evaluated as substitutes for Napier and Desmodium (Bhandari, 2009).

**Silage**

Silage is the storage of green feed in a pit covered with plastic, so that it ferments and, as such, maintains its quality. The most common silage is of maize, but other forages can be stored. Good feed must contain dry stubble to ensure fibre content. Silage is utilized in more specialized dairies because it involves greater expense: digging the pit, paying the farmhands, the chopper and the plastic.

**Cottonseed**

Cottonseed is a by-product of cotton production and can be purchased relatively cheaply in cotton-producing areas at harvest time. It is a high-energy feed and, together with bran and mineral salt, provides an almost completely balanced diet for dairy cattle. Before giving this feed, straw or maize husks must be fed to the cattle to balance their diet with fibre. Purchasing, transporting and storing the seed require a large investment, which is often done in cooperative groups or specialized dairies. Feeding cottonseeds can cause problems, especially in young animals, because of the insecticides utilized in the cultivation of cotton. The effects on humans are unknown.

**Urca**

Dry fodder crops can be improved in their feeding quality by adding urea and molasses (sugarcane syrup – a by-product of the sugarcane industry) to increase palatability and nitrogen content for cattle. This practice is not without risk, as urea is toxic when applied in too large quantities. Animals need to be accustomed to this product little by little.

**Making balanced feed**

It is possible to optimize diets in more specialized husbandry systems, seeking a balance between maximum production and cost optimization using relatively inexpensive and easily accessible feed.

Balanced rations can also be made from a basis of maize or sorghum, defatted soybean flour, defatted cottonseed flour or sunflower and mineral salt. Its quality can vary widely depending on its content. Generally, it is of excellent quality, but at a high price. An advantage is that it can be purchased in small quantities.

Here is an example of a complete yet simple dairy cow feed formulation containing all of the nutrients needed for optimum maintenance and production, using locally available feed ingredients (Bhandari, 2009):

- 2 parts of rice bran or wheat bran;
- 1 part of maize, millet or sorghum;
- 1 part of mustard/cottonseed/sunflower cake or any bean. Grind all feed ingredients together well and feed at the rate of 1–2% of the body weight.

**Mineral supply**

The strategies for low-input livestock keeping that are described in detail in Chapter 9, can be maintained and improved in more specialized systems:

- Provide ordinary (kitchen) salt;
- Preparation of simple mineral block;
- Vitamins.
Additional mineral and vitamin supplement strategies in more specialized systems are shown below.

**Provide mineral salt**

In more specialized systems, it is necessary to supplement feeds not only with kitchen salt but also with other minerals to prevent weight loss, maintain high milk production, growth rates and reproductive functions. It is necessary to maintain complete mineral supplements year round, for example through commercial or homemade mineral blocks.

Reducing the amount of mineral salt in the feed of dairy cattle for a few months is a common practice to reduce costs in low-input dairy husbandry. Nevertheless, under the logic of more specialized husbandry, it is more favourable to sell down livestock numbers in times of stress in order to maintain the level of nourishment for the remainder of the herd. The lack of mineral salts in dairy cattle, especially higher-producing breeds, generates problems with reproduction, yielding difficulties at calving, smaller birth weights or stillbirths, which constitute a loss many times more valuable than the saved mineral salt.

Mineral supply is essential for all kinds of animal keeping, and even more so in more-specialized livestock production (Fig. 10.3). The lack of mineral salts in dairy cattle, for example, especially higher-producing breeds, generates problems with diseases resistance, parasites as well as reproduction. Though less tangible, this constitutes a loss many times the value of the cost of the mineral salt.

Much needs to be understood about the need for different minerals in different species of animals and at different stages of production and reproduction. For example, sheep cannot tolerate as much copper in their feed as do goats, so using the same copper supplemented mineral mix for both species requires an educated look at the ingredients of the product. Moreover, mineral deficiencies also depend on the mineral contents of the soil and forage of the particular area. For example, if an area is particularly deficient in selenium, then reproductive functions and some illness can result. Species differences are also common.

**Provide vitamins**

In more specialized livestock keeping, the separate provision of vitamins is less necessary than in low-input keeping, especially when animals are provided with balanced feeds and other high-quality products.

2: Improved Pasture and Rangeland Management

Upon making the change from low-input or more diversified husbandry to more specialized husbandry, improved pasture
and rangeland management is another essential element. The objective of more specialized systems is a straightforward, year-round (or, at best, season long) availability of good-quality pasture grasses, forbs and brush for all animals (Table 10.2). This needs to be produced with good mineral efficiency, and be based on healthy soils, with good soil life.

The recommendations for pasture and rangeland management in more specialized livestock keeping are divided into two parts: (i) pasture management; and (ii) rangeland management. Please note that is not intended to be a complete guide for this extensive topic, which is also under continuous discussion.

### Improved pasture management

Good pasture management is a challenging factor for more specialized livestock keeping. In low-input livestock keeping, pasture management is not much used. The only common form of pasture management in low-input systems is controlled through grazing, for example, by tying the animals to a pin and regularly moving them. Grazing young stock that are already weaned away from the older stock helps to cut down on the transfer of internal parasites. These strategies that are described in detail in Chapter 9 can be maintained and improved in more specialized systems:

<table>
<thead>
<tr>
<th>Pasture and rangeland management</th>
<th>Objectives</th>
<th>Pasture</th>
<th>Rangeland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified systems</td>
<td>Reduced overgrazing and soil erosion</td>
<td>Controlled grazing</td>
<td>Reviving communal grazing control</td>
</tr>
<tr>
<td></td>
<td>Reduced bush encroachment</td>
<td>Zero-grazing system</td>
<td>Fencing off grazing areas</td>
</tr>
<tr>
<td></td>
<td>Increased carrying capacity</td>
<td>Special grazing areas for dry period</td>
<td>Rotational grazing</td>
</tr>
<tr>
<td></td>
<td>Increased resistance against drought</td>
<td>Controlled and prescribed burning</td>
<td>Special grazing areas for dry period</td>
</tr>
<tr>
<td></td>
<td>Community organization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More specialized systems</td>
<td>Sufficient fodder available year round</td>
<td>Plant fodder crops</td>
<td>Effective weed control</td>
</tr>
<tr>
<td></td>
<td>Good-quality fodder</td>
<td>Pasture rotation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good N and P efficiency</td>
<td>Special pastures for young stock</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase soil fertility and soil life</td>
<td>Zero-grazing system</td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Controlled grazing;
• Zero grazing system.

Additional pasture management strategies in more specialized systems are described below.

Weed control

Weed control is often taken care of by strategic rotation of animal species or mechanical means. Only in severe infestation cases are chemical means used.

Fertilization of pastures

Fertilization of grazing lands varies in more specialized systems and is usually limited to the use of livestock manure, either directly applied by grazing animals or spread mechanically from composted materials. This provides readily accessible organic materials back to the soil for decomposition.

Commercial fertilizer granules composed of nitrogen, phosphorus and potassium (NPK) along with lime to adjust soil pH can also be applied to rangelands. These should be preceded by an assessment of the soil needs by a professional soil scientist or sample analysed in a laboratory.

Soil humus health must also be considered. Commercial application of a specific NPK or lime fertilizer lacks this component. Organic material sources provide improvements to soil tilth, or suitability to be tilled, that helps to hold soil moisture and build a body to the soil while the basic chemicals that describe soil fertility can come from either source.

Milk and carry system

For dairy animals, pasture management systems can be designed so that cows are gathered for milking at designated places in the pasture. Milking equipment can be kept in the pasture, where animals are either tethered for milking or milked freely. Instead of a cut and carry system (see also zero-grazing), this is a milk and carry type of management, which is also common in low-input livestock keeping.

Zero-grazing system

In order to reduce the pressure on the pastures, sometimes it can be advantageous to use the zero-grazing system in which the feed is brought to the animals. This implies a transition to a more specialized animal keeping system. Zero-grazing systems can be used with any of the grazing species, such as cattle, goats and sheep, and even with chickens, pigs, rabbits and other animals kept for production and marketing. Animals are housed in an appropriately sized and simple shed with a slatted wood or hard dirt floor all made from local materials. Animal droppings fall through the slats onto the ground below and can be collected easily for composting or direct fertilization of crops.

(See also later section on Protection and Housing.)

Improved rangeland management

In low-input systems, rangeland management objectives relate to reducing the encroachment of brush, reducing soil erosion, increasing the carrying capacity of the land and managing through drought conditions.

The strategies for low-input and diversified livestock keeping that are described in detail in Chapter 9 can be maintained and improved in more specialized systems:

• Reviving communal grazing control;
• Use of traditional animal species, such as camelids;
• Fencing off grazing areas;
• Rotational grazing;
• Reviving indigenous practices to reduce bush encroachment, such as prescribed fire.

Additional recommendations for more specialized animal keeping are given below.

Mob grazing

Pasture rotation systems are many and varied. Sometimes called mob grazing, the aggressive control of where ruminants graze...
can be quite beneficial to the rangeland and can be a positive benefit to reduction of greenhouse gases while improving soil carbon retention. Hooves loosen the soil as the animals graze together (Fig. 10.4). The heavy deposit of manure and urine in the mob-grazed area leaves the ground ready for rains and rapid regrowth of vegetation, once the animals are moved to their new grazing spot.

The feature of mob grazing that must be kept in mind is that the animals must graze down the vegetation within a designated area thoroughly before being moved. They cannot be allowed to eat only what tastes good, but all vegetation. Sometimes this is facilitated by concurrent or sequential grazing of cattle, goats and sheep. These three species all prefer different types of forage and can be managed so that all grasses, forbs and shrubs in a given area can be fully utilized.

When well managed, mob-grazing systems actually allow greater utilization of pastures so that more animal growth results from a given area than when animals are given free choice to the entire area at one time. In this type of management system one must be aware of the specific optimum grazing depth so that plants are not eaten down to the point that they will not grow back quickly or grow back at all. Each plant has its optimum height of vegetative material above ground that is needed for the root to stimulate regrowth. Too much grazing down will kill or severely retard regrowth.

3: Water Provision

Dirty water or insufficient water is a factor that seriously limits any form of animal husbandry. This essential and basic element is too often neglected and under-estimated, especially in smallholder conditions (Table 10.3). The possibilities for improvement logically depend on the conditions of each place. Bad water quality or lack of water can greatly reduce productivity and can go relatively unperceived until too late. In more specialized systems, extra attention needs to be given to water quality and quantity.

Fig. 10.4. Pasture rotation systems require extra inputs but can be beneficial for the rapid regrowth of the vegetation. Credit: Ann Wells.
Table 10.3. Comparing objectives and recommendations for improved water provision in smallholder low-input and diversified livestock keeping (with more specialized animal husbandry).

<table>
<thead>
<tr>
<th>Water</th>
<th>Objectives</th>
<th>Access to water</th>
<th>Water quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified</td>
<td>Regular water uptake</td>
<td>Water 1–2 times a day</td>
<td>Prevent polluted drinking water for animals</td>
</tr>
<tr>
<td>systems</td>
<td>Water quality sufficient</td>
<td>Opt for animal species that require little water</td>
<td>Prevent pollution of water for human use by animals</td>
</tr>
<tr>
<td></td>
<td>Pollution of human water sources prevented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommendations for</td>
<td>Regular daily watering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>improvement</td>
<td>Opt for animal species that require less water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More specialized systems</td>
<td>Good water availability</td>
<td>Continuous access or provide 3–4 times per day</td>
<td>Prevent pollution of drinking water by crop chemicals and artificial fertilizers</td>
</tr>
<tr>
<td>Recommendations for</td>
<td>Quality year round</td>
<td></td>
<td></td>
</tr>
<tr>
<td>improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The recommendations for water provision in low-input livestock keeping are divided into two parts: (i) access to water; and (ii) water quality.

**Access to water**

The strategies for securing access to water in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Regular daily watering;
- Opt for animal species that require less water.

Additional recommendations for more specialized animal keeping are described below.

*Access to water at least three to four times a day*

In more specialized systems, the need for water is larger than in low-input livestock keeping, because of higher levels of production. The animals need water refreshment at least three or four times a day, with more frequent access in extremely hot weather.

**Water – how much?**

A good rule of thumb is to provide 1/20 of the animal’s body weight in the weight of water each day (Fig. 10.5). One can figure out rough estimates for each animal using this conversion: 1 l of water weights about 2 pounds; 1 gallon of water weighs about 8.35 pounds. Thus, an 800-pound (365-kg) cow needs about 5 gallons (or 18 l) of clean water per day.

**Water quality**

The strategies for securing water quality in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Prevent polluted drinking water for animals;
- Prevent pollution of human drinking water sources by animals.

Water sources need to be protected from all sources of contamination, whether from barnyard waste materials or other pollutants. This is easier said than done and depends on local circumstances. Extra efforts in this
direction are, however, efficient and low-cost ways of improving livestock production and reducing animal mortality.

4: Control of Infectious Diseases

Contagious infectious diseases with high mortality are a common problem in low-input livestock keeping as well as in more specialized livestock keeping. Each animal species has one or two major infectious diseases that are often possible to prevent relatively easy through regular vaccinations. In order to accomplish the aim of reducing animal mortality, it is necessary to focus especially on the control of these infectious diseases (Table 10.4).

The objective of infectious disease control in more specialized systems is to reduce the incidence of various diseases, besides these most common contagious diseases, without overlooking zoonotic infections (diseases transmitted between animals and man). Differences between the low-input and more specialized systems begin to appear in the practices of prevention and treatment.

The recommendations for the control of infectious diseases in more specialized livestock keeping are divided into two parts: (i) animal health services; and (ii) vaccination.

Animal health services

The strategies for securing animal health services in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Supporting ethno-veterinary practices and practitioners;
- Promote synergy between traditional and modern remedies;
- Train community-based animal health workers;
- Increase awareness about zoonosis.

Additional recommendations for more specialized animal keeping are described below.

Ethno-veterinary practices in more specialized livestock keeping

The collection and use of local healing knowledge and remedies is the practice of ethno-veterinary medicine. Ethno-veterinary animal health care – like commercial animal health care – can be broken into three basic areas of importance:

- The prevention of disease, which involves most of the practices of livestock management, from housing, nutrition, husbandry, environmental management as well as preventive vaccines;
- Disease treatment;
- Animal health surveillance. This is the identification of diseases and conditions with the aim of preventing spread, controlling infections and public health safety.
<table>
<thead>
<tr>
<th>Infectious diseases</th>
<th>Objectives</th>
<th>Animal health services</th>
<th>Vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified</td>
<td>Reduced incidence of zoonosis</td>
<td>Support ethno-vet service</td>
<td>Vaccination of one or two major diseases</td>
</tr>
<tr>
<td>systems</td>
<td>Reduced animal mortality because of infectious disease</td>
<td>Train community animal health workers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Promote synergy between traditional and modern remedies</td>
<td>Awareness of zoonoses</td>
<td></td>
</tr>
<tr>
<td>Recommendations for</td>
<td>Improved access to local animal health services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More specialized</td>
<td>Improved use of ethno-vet medicine</td>
<td>Ethno-vet practices strengthened</td>
<td>Extended vaccination programmes</td>
</tr>
<tr>
<td>systems</td>
<td>Improved use of commercial medicine</td>
<td>Training in improved use of commercial medicines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>One Health – human and animal medicine join forces</td>
<td>Disease surveillance, Monitoring and recording of disease incidence</td>
<td></td>
</tr>
</tbody>
</table>

Ethno-veterinary practices and community healers are most common in the low-input systems, while commercial preparations and professionally trained practitioners tend to be more common in the more specialized systems – especially with high value animals (Fig. 10.6). At the same time, in all livestock-keeping systems, even specialized high-input systems, farmers’ local knowledge and experience is a valuable asset when it comes to animal health practices.

*Community-based animal health workers in more specialized livestock keeping*

Adequately trained community members can provide effective service to community livestock keepers, including those with more specialized livestock keeping, for a small fee. Community animal health workers can make a lifelong profession out of this work that supports their family and supports the community. In some cases, they set up small shops in their communities with veterinary and agriculture supplies and equipment (Birmingham and Quesenberry, 2007).

Training, retraining and monitoring of community animal health workers is managed by NGOs, farmers’ organizations or government extension service.

Often the community animal health workers combine traditional and modern medicine, but this is not always the case. They will especially favour modern medicine when this is their major source of income. Sometimes farmers with very high
value animals will prefer a formal veterinarian over a community animal health worker.

**Conventional professional animal health care services**

As more high-input and specialized livestock-keeping units start emerging in a region, the call and financial opportunities for formally trained veterinary practitioners begin to grow. These are often linked to commercial association of veterinary products, and tend to focus on modern and large-scale specialized livestock keeping, rather than low-input and diversified livestock keeping.

These conventionally trained veterinary caregivers can play an essential role in working together with local healers, community animal health workers and farmers in facing the following challenges:

- Training of improved use of commercial medicine;
- Monitoring and recording of disease incidence;
- Strengthening ethno-vet practices by appropriate combination with conventional medicine.

**Improved used of commercial medicines**

The indiscriminate and uncontrolled use of commercial products in smallholder livestock keeping is a major problem that in time can lead to human health problems related to residues in milk, meat and eggs. This is often complicated by the quality of the products being in question. If there is no strong regulatory system in the country, counterfeit and low-price medications may be abundant. Good training and mindful compliance is a safeguard against drug misuse (Fig. 10.7).

Common problems with poorly regulated commercial products are:

- Low quality of products sold: Not all manufacturers follow the required standards in the manufacture of products.
- Low quality because of poor storage: Medicines and vaccines should be...
stored in a clean, safe, temperature-controlled environment. If refrigeration is required to maintain potency, then this must be observed at all times; this is especially true for most vaccines.

- **Expiration dates**: Commercial products from legitimate pharmaceutical and biological (vaccines) manufacturers carry an expiration date, beyond which the potency and safety of the product cannot be supported by the manufacturer. Products should be destroyed when they have reached their expiration date.

- **Inadequate use**: Commercial medicine needs to be used according to the statements on the label. This may not happen, in some cases. Because of their cost, antibiotics, for example, are often not applied the number of days indicated, but only during the period with visible symptoms. This will, however, increase the incidence of resistant microbes to this antibiotic. The same is true for anti-parasitic treatments. Poor compliance in following label recommendations is one of the most critical problems related to the use of commercial medicine in conditions of low-input or more specialized livestock keeping.

- **Indirect hazards to human health**: Follow milk withholding and slaughter withdrawal times listed on the label. This is the responsibility of the owner and other health professionals. If milk withholding times and slaughter withdrawal times are not observed after the treatment, the meat and milk consumed can then contain residues of the medication, which can cause various health risks to the consumer. There are already major threats because of multi-resistant strains of microbes (Kumarasamy et al., 2010).

- **Direct hazards to human health**: Several products, especially insecticides used for external parasite control, are hazardous to people or to the environment if they are not mixed or used according to the label. When using these types of product, protective clothing, gloves or eyewear are advised.

**One Health concept**

It is becoming much more evident that human health, animal health, public health and environmental health are all connected. This recognition has led to the
emergence of an initiative that is variously known as One Health or One Medicine and is bringing practitioners of each field together.

One Health may seem far removed from the low-input livestock systems, however it has immense implications in villages with limited resources, especially related to the control of zoonotic diseases (WHO, 2005). When veterinary and human health services join forces, for example vaccinations against rabies can be more efficient if they cover dogs and cattle in one community at the same time (Fig. 10.8).

The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. The synergism achieved will advance health care for the 21st century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving medical education and clinical care. When properly implemented, it will help protect and save untold millions of lives in our present and future generations (Be.Troplive, 2010).

**Disease prevention through vaccination**

In more specialized animal keeping, control of infectious diseases through vaccination is extra-important, because of the high individual value of each animal and the larger number of animals kept together. The strategies for control of infectious diseases in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems, for example for swine fever in the case of pigs; Newcastle disease in the case of chickens; and blackleg, hemorrhagic septicemia and anthrax in the case of cattle.

*Additional vaccination against major infectious diseases*

In more specialized systems, the risk of infectious disease is higher because of higher animal numbers. Especially when exotic breeds are introduced, there is a need for vaccinating against other infectious diseases. The more specialized the system, the larger the number of diseases against which the animals are vaccinated. The vaccines used are often against diseases that do not only cause direct mortality but also affect the animals in their productivity. According to animal species, the vaccination schemes need to be strictly applied.

**5: Parasite Control**

Parasites – both internal and external – are a common problem in low-input livestock keeping as well as in more specialized livestock keeping (Table 10.5). In general, parasites have a more devastating effect on young animals and exotic breeds – such as Holstein cows or Yorkshire pigs – than on adults and animals of local breeds. They also affect weak and malnourished animals.
### Table 10.5. Comparing objectives and recommendations for improved parasite control in smallholder low-input and diversified livestock keeping (with more specialized animal husbandry).

<table>
<thead>
<tr>
<th>Parasite control</th>
<th>Objectives</th>
<th>Internal parasites</th>
<th>External parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified systems</td>
<td>Reduced incidence of internal and external parasites</td>
<td>Make use of natural resistance of local breeds</td>
<td>Make use of natural resistance of local breeds</td>
</tr>
<tr>
<td></td>
<td>Prevention of parasitic zoonoses</td>
<td>Reducing parasite incidence in grazing and feeding areas</td>
<td>Use of medicinal plants for parasite control (ethno-vet)</td>
</tr>
<tr>
<td></td>
<td>Reduced loss of young stock</td>
<td>Parasite control especially in young stock</td>
<td>Community control activities (dips)</td>
</tr>
<tr>
<td></td>
<td>Improved leather quality</td>
<td>Support ethno-vet remedies for parasite control</td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td>Make use of natural resistance of local breeds</td>
<td>Regular treatment all stock</td>
<td>Regular dips/spray of all stock</td>
</tr>
<tr>
<td></td>
<td>Reducing parasite incidence in grazing and feeding areas</td>
<td>Medicinal plants and commercial medications</td>
<td>Medicinal plants and commercial medications</td>
</tr>
<tr>
<td></td>
<td>Parasite control especially in young stock</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Support ethno-vet remedies for parasite control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regular treatment all stock</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medicinal plants and commercial medications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

more than healthy ones. Moreover, in warm and humid climates, parasites are more prevalent than in dry and cold climates. Therefore, incidence and the necessary control measures vary according to zone, species, breed, age and general state of the animals. For this reason, specific guidelines are difficult so consult local livestock holders, extension personnel and local healers.

Another problem related to both internal and external parasites in animals is that some of them can pass to people (parasitic zoonoses).

In low-input systems, the objective for control is usually the reduction of incidence to protect young stock and the quality of products and by-products, such as meat and hides. Methods of treatment are often herbal remedies or the reliance on natural resistance in local breeds for both internal and external parasites.

In more specialized systems, a more aggressive approach to parasite control needs to be taken. Even low incidence of external and internal parasites can draw down the resistance and growth of animals leading to loss of profit and death of the animals. Animals from highly productive breeds are especially susceptible. As in all systems, young growing stock usually suffers the most from parasite infestations.
The objective of all control mechanisms is to limit the effect of parasites to the extent that they do not affect growth and production. In the highly productive breeds, this usually requires regular anti-parasite treatments, which is becoming less effective because of resistance being developed by the parasites to the medical compounds used. Much can be done by natural means, such as strategic control of the grazing areas of the animals, use of novel natural substances and culling of individuals that carry the heavier loads of parasites.

The recommendations for parasite control in more specialized livestock keeping are divided into two parts: (i) control of internal parasites; and (ii) control of external parasites.

Control of internal parasites

Most types of internal parasites reproduce through a life cycle including eggs, larvae, pupae and adults. Many of the life cycles take place by deposition of manure on grassland followed by consumption of pre-infective or infective stages that further mature back in the animal’s body. Eggs can survive outside the body for a certain period, and develop through several stages and life forms. Finally, the juvenile forms climb up the plants to be eaten by livestock. This process is greatly enhanced by high temperatures and humidity. As a result, the control of parasites in all animal keeping systems is a combination between animal-related measures and the control of grazing.

The strategies for controlling internal parasites in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Make use of natural resistance of local breeds;
- Reduce parasite incidence in grazing and feeding areas;
- Special focus on young animals;
- Support ethno-veterinary treatments and practices for parasite control.

Additional recommendations for more specialized animal keeping are described below.

Regular treatments, especially in young stock

Internal parasites have a dramatic effect on young animals, of both exotic and local breeds – though the effect on young animals of exotic breeds is more dramatic. The young become thin with swollen bellies. They grow abnormally slowly and they may even die. Parasitism, in combination with insufficient nutrition and the use of exotic breeds, is the major reason why livestock-keeping projects fail, especially in marginalized areas. Young animals in all animal production systems (Fig. 10.9) need extra treatments and care to reduce parasite numbers – while good nutrition can largely help to overcome the effects of parasites.

Timing of treatments

Timing of any anti-parasite treatment is critical for effective control. Thus, learning the life cycle stages is a key factor in use of internal parasite preparations. Treatment is often done prior to turning animals out for grazing in order to diminish infestation of the fields with parasite eggs, and subsequent exposure of the animals.

Treat new animals coming into the flock

All new animals need to be treated before joining an existing flock, in order to prevent introduction of new parasites.

Combine treatment with pasture rotations and good-quality feeding

Regular rotation of pastures, in combination with regular treatments and good-quality feeding, are essential elements in internal parasite control, especially in young animals of crossbreeds or exotic stock.

Prevent resistance against commercial products

Improper and too frequent use of commercial anti-parasite products can lead to the development of resistance of the parasites against...
the chemical composition of the drug. This can lead to multi-resistant parasites – which are extremely difficult to control.

**External parasites**

External parasites, such as lice and mites, can reproduce directly on the animal. Other species, such as ticks, have another reproduction strategy, in which the juvenile forms live on vegetation. At certain stages, they need to encounter an animal in order to complete their life cycle and reproduce. Therefore, the control of external parasites is a combination of measures directly related to the animals with measures to reduce parasite levels in the environment.

When deciding on treatment regimens, it is important to treat all animals in a group. Treatment of one or a few animals in a group is usually short lived. Truly effective and long-lasting internal parasite control will take a combination of using animal breeds with some resistance against existing parasites, effective bush control, pasture rotations, prevention of co-mingling, strategic use of systemic commercial dips or sprays, and ethno-veterinary anti-parasitic preparations.

The strategies for controlling internal parasites in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Make use of natural resistance of local breeds;
- Support ethno-veterinary treatments and practices for parasite control;
- Community control activities of external parasites.

Additional recommendations for more specialized animal keeping are given below.

**Treat new animals coming into the flock**

All new animals need to be treated effectively before joining an existing flock, in order to prevent introduction of new parasites. Avoidance of co-mingling animals in markets or communal pastures is also a wise method to prevent transmission.

**Combine treatment with pasture rotations, bush control and good-quality feeding**

Regular rotation of pastures, in combination with regular treatments and good-quality feeding, are essential elements in internal parasite control, especially in young animals of crossbreeds or exotic stock. Bush control, especially controlled burning of old vegetation, can be another way of reducing tick numbers.

Fig. 10.9. Young animals in all animal production systems – and especially those of exotic breeds – need extra treatments and care to reduce parasite numbers – while good nutrition can largely help to overcome the effects of parasites. Credit: Ellen Geerlings.
Prevent resistance against commercial products

Past recommendations for more specialized livestock system parasite control often included frequent spraying or dipping of animals with certain commercial parasite control medications. This has led to the problem of some flies, ticks, lice and mites becoming resistant to the preparations that were regularly used. Since those products are no longer fully effective, such multi-resistant external parasites have become major problems (Fig. 10.10). Regular treatments are no longer a recommendation for parasite control products, even with novel rotation schemes of parasite product.

6: Improved Breeding and Selection

Breeding the best animals is a central challenge in any animal production system. Farmers want healthy and high-producing animals that are adapted to their environment. In low-input systems, this challenge is especially great, because of the challenging environment with seasonal feeding shortages, specific parasites and diseases as well as the multiple roles of the animals. In more specialized systems, more productive traits are required besides the need for robust and healthy animals (Table 10.6).

The recommendations related to local breeding and selection in more specialized livestock keeping are divided into two parts: (i) use and choice of breeds; and (ii) breeding management.

Use and choice of breeds

The strategies for the use of choice of breeds in low-input livestock keeping are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Breeding selection on the basis of local criteria;
- Use of recommended local breeds.

Additional recommendations for more specialized systems are presented below.

Genetic improvement of local breeds through selection

Numerous valuable local animal breeds have been developed over time in the context of seasonal feeding shortages, specific parasites and diseases as well as the multiple roles of the animals.

Fig. 10.10. Correct spraying with insecticides – either commercial or made from medicinal plants – reduces the external parasite incidence.
Table 10.6. Comparing objectives and recommendations for improved breeding and selection in smallholder low-input and diversified livestock keeping (with more specialized animal husbandry).

<table>
<thead>
<tr>
<th>Breeding</th>
<th>Objectives</th>
<th>Use of breeds</th>
<th>Breeding management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified</td>
<td>Maintain important local breeds</td>
<td>Breeding selection on basis of local</td>
<td>Prevent inbreeding</td>
</tr>
<tr>
<td>systems</td>
<td>Make use of important traits of local breeds</td>
<td>criteria</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effective selection</td>
<td>Use of improved local breeds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prevent in-breeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommendations for</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More specialized</td>
<td>Increased productivity</td>
<td>Improved local breeds</td>
<td>Breeding only at minimum age and weight</td>
</tr>
<tr>
<td>systems</td>
<td>Effective selection</td>
<td></td>
<td>Strict control of uterine infections</td>
</tr>
<tr>
<td></td>
<td>Selective use of exotics</td>
<td>Crossbreeding between 25% and 75% of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good reproduction rates</td>
<td>exotic genetics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintain local breeds for crossbreeding</td>
<td>Selection of bulls</td>
<td>Effective heat detection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(with artificial insemination)</td>
</tr>
<tr>
<td>Recommendations for</td>
<td></td>
<td>Selected use of artificial</td>
<td></td>
</tr>
<tr>
<td>improvement</td>
<td></td>
<td>insemination</td>
<td></td>
</tr>
</tbody>
</table>

The myth of the ‘unproductive’ local breeds is a hard-to-crack notion, because indeed local breeds are usually less productive in conventional terms than the so-called exotic or high-yielding breeds. These local breeds can be further selected and improved in terms of improved growth rates, improved milk production and other marketable traits. These improved local breeds can stand at the basis of more specialized animal keeping. This, however, requires a special process of breeding and selection. Most livestock projects promoting more specialized livestock keeping opt for another – and more readily available alternative introducing exotic breeds or crossbreeding exotics with animals of the local breed. This has both advantages and disadvantages.

The first step in a breeding programme is to look over the individuals of the local breed and make selection decisions on those strengths and weaknesses of males and females. This is best done with direct support of the livestock owners themselves (Fig. 10.11). Experience shows that this kind of genetic improvement through effective selection can give rise to exceptionally productive local breeds that still maintain their innate resistance and other locally valuable traits.

There are numerous examples of this practice throughout the world – though not all examples are well documented. One example is the experience of local cattle breeds from India (Gir and Kankrej from Gujarat, and Ongole from Andhra Pradesh).
that were imported into Brazil in the 1960s. Besides producing meat, these breeds were developed as excellent milk breeds after a process of selection. In fact, the world’s best Gir cows today live in Brazil and give around 5500 l of milk on average per lactation. Comparing these with the neglected cousin in India, which do not yield more than 980 l, the Brazilian Gir yields roughly six times more (Sharma, 2010).

Other well documented examples are the improvement of the Aseel backyard chicken breed with support of ANTHRA in the Andhra Pradesh region of southern India (Ghotge and Ramdas, 2007) and the improvement of local Tzotzil sheep by the Indigenous Institute of Chiapas University (Perezgrovas, 2006).

This usually requires an exceptional support effort in combination with effective local organization. Sometimes the improvement of local breeds is being done in research or formal breeding institutes. This runs the risk of selecting traits that are not of major importance to the population involved.

Bringing in exotic breeds through crossbreeding

Faster changes are often desired, however. This can be done with the introduction of exotic breeds utilizing artificial insemination (AI) techniques or the import of new males, often called exotics. Many livestock development projects promote crossbreeding local breeds with exotics, with the primary objective of improving the productivity of next generations of offspring. Male animals with superior characteristics in terms of productivity are bred to local females. This can result in improved growth rates, improved milk production and other marketable traits. It is not without complications, though, because of the need for improved nutrition, some changes in management and facilities and possible decrease in innate disease resistance and ability to survive in stress conditions in the offspring.

Though this is not always implicitly recognized as such, this option implies a change from low-input into a more specialized animal keeping system. Any crossbreeding programme requires a careful consideration of the advantages and disadvantages of co-mingling the genetics of quite different breeds or family lines and the acclimatization to new environments for the offspring (Fig. 10.12). The greatest danger in using exotics lies with the ability – or inability – of the offspring to survive under conditions to which the exotic is not accustomed. Another factor to consider is that larger exotic animals may be more difficult to handle than local animals,
or may have a size too large for regular sale on the local market.

**Breeding management**

*Prevent inbreeding*

Many livestock keepers have effective knowledge and practice related to breeding. However, it is common to find inbreeding, in both low-input and more specialized livestock keeping. Related animals breed among themselves, gradually resulting in a genetic degeneration. It does not cause mortality directly, but can lead to deformed, weak and poorly growing animals that are more likely to die.

Depending on the species, there are practices to deal with this problem:

- Selection of breeding males and castration of all other male animals;
- Timely castration of males, so they cannot mate with their mother/sisters;
- Regular exchange of reproductive males;
- Dividing animals in age groups.

**Artificial insemination**

The transfer of frozen semen from selected exotic males using AI techniques is routinely practised in cattle and some other species. Frozen semen can be transported over long distances in special shipping tanks and, if liquid nitrogen is available to maintain the frozen condition of the materials, the use of exotic bulls can take place almost anywhere in the world. Transferring fresh (not frozen) semen is also practised in some areas and with some species, but requires clean handling facilities and having both the male and the females in relatively close proximity. Pregnancy rates from AI are normally lower than with natural breeding.

There are many factors that go into having a successful AI programme, so the decision to go into this breeding practice must be considered in all aspects. Often, the lack of or interruption of supply of liquid nitrogen is a major limiting factor. AI technicians must be well trained and the basic equipment must be in place and in good condition. Heat detection of the animals to be
bred is an art to be learned by the herd owner. Good records kept by the farmer for birthing dates and other heat dates are necessary. Females must be in a good nutritional plane and have healthy reproductive tracts. A decrease in any one of these factors will result in zero offspring or only a few pregnancies, at best.

Even with an excellent AI programme, there is the need for a male animal to breed the females that do not conceive to AI attempts. Thus, even though the costs and complexities of keeping males are decreased, they are not eliminated.

Advantages of artificial insemination:
- Genetic improvement through cross-breeding by use of selected quality semen;
- Decreased costs of feeding and housing male animals;
- Prevention of infectious reproductive diseases through natural mating;
- Documented pedigrees.

Disadvantages of artificial insemination:
- Lower fertility rate;
- Requires time and special skills of farmer for heat detection;
- Requires technical and communication infrastructure, transport and specialized input of inseminator;
- Requires technical infrastructure for semen collection, storage and transport of semen.

7: Improved Protection and Housing

Efficient protection and housing is a central element to reduce animal mortality in low-input as well as more specialized animal keeping (Table 10.7, Fig. 10.13). No major constructions are necessary – efficient constructions based on local materials have been developed by livestock-keeping families. A world can still be gained in this respect, however, as mortality because of

<table>
<thead>
<tr>
<th>Protection</th>
<th>Objectives</th>
<th>Predators, accidents and the theft protection</th>
<th>Weather protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified systems</td>
<td>Reduced loss because of predators, theft and trampling</td>
<td>Protection of young animals during first weeks</td>
<td>Provide simple night shelters</td>
</tr>
<tr>
<td></td>
<td>Effective low-cost construction with local materials</td>
<td>Protection during brooding and caring for young</td>
<td>Trees for shade in fields</td>
</tr>
<tr>
<td></td>
<td>Prevent transmission of zoonotic parasites</td>
<td>Night shelters</td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td>Prevent cross-contamination between animal manure and human waste</td>
<td></td>
</tr>
<tr>
<td>More specialized systems</td>
<td></td>
<td>Milking shed, ventilation, manure pit management</td>
<td>Housing for zero-grazing</td>
</tr>
</tbody>
</table>

Table 10.7. Comparing objectives and recommendations for improved protection and housing in smallholder low-input and diversified livestock keeping (with more specialized animal husbandry).
Predators, theft and trampling is excessively high in low-input livestock keeping. This is especially the case amongst young animals.

In more specialized livestock keeping, housing is also used in zero-grazing systems and has an additional benefit of reducing the contamination of milk and other products. Moreover, effective protection in simple constructions can reduce the risk of transmitting animal diseases to humans.

The recommendations related to protection in more specialized livestock keeping are divided into two parts: (i) effective protection; and (ii) zero grazing systems.

Effective protection

The strategies for protection against predators, accidents, theft and adverse weather conditions are described in detail in Chapter 9, and can be maintained and improved in more specialized systems:

- Protection during the first weeks of life;
- Protection during brooding;
- Simple birthing pen, for example for piglets;
- Shade and wind breaks in the field;
- Special night shelters.

Additional recommendations for more specialized animal keeping are described below.

Milk production units

Milk is often called nature's perfect food. However, milk is also an excellent medium for growth of foreign organisms like bacteria. In more specialized milk production units it is favourable to use sheds that are designed to reduce insect pests, and to get clean milk rapidly from the mother into a cooler or fermenting jar. Milk hygiene is critical for making good products and getting the products to market.

Ensure that the milk facility and equipment are clean and meet local milk ordinance standards for production type. Those doing the milking practice also need to maintain good personal hygiene. The shed also needs to be constructed so that the animals can move easily from the loafing/eating areas to the milking areas. Raised and solid floors help to keep moisture from collecting under foot and make it easy to remove manure.

Ventilation

Fresh air is important in all-weather types. It is unfortunately a practice in many cold
regions to house livestock in a closed barn in the winter with the doors and windows closed and with little fresh air ventilation. The build-up of ammonia gases is almost overwhelming in this kind of more specialized livestock keeping.

Even high-producing dairy cattle can stand the cold relatively well and can live comfortably in temperatures well below our own level of tolerance. As long as animals can be out of standing water and out of the wind, they live very well in colder climates. Closed barns should have moving ventilation through strategically placed open windows and doors that draw a slight breeze through the facility.

**Zero-grazing systems with fodder crops**

**Zero-grazing systems**

Zero-grazing is one of the more developed practices in more specialized systems of livestock management for smallholders. It means keeping animals in a stall, and bringing fodder to them instead of sending them out to graze over large tracts of land. It is also sometimes called ‘cut-and-carry’. With dairy animals, for example, it is a system that produces more milk from a small amount of land or from a rangeland grazing style of feeding.

Zero-grazing systems can be used with any of the grazing species, such as cattle, goats and sheep, and even with chickens, pigs, rabbits and other animals kept for production and marketing. Animals can be housed in an appropriately sized and simple shed with a slatted wood or hard dirt floor all made from local materials. If slat floors are used, the shed is raised about 1 m above the ground.

In other zero-grazing systems, the animals are tied to a rope, or can move around in a larger shed or open space with a simple roof building.

The major advantages of zero-grazing are:

- Reduced number of pests, especially ticks and intestinal worms;
- Reduced loss of animals because of extreme weather, theft and predators;
- More land is available for growing fodder;
- Damage to crops by grazing cattle is reduced;
- Animal droppings that fall through the slats onto the ground can be collected easily for composting or direct fertilization of crops;
- Manure can be used for biofuel.

The major disadvantages of zero-grazing systems [Fig. 10.14] are:

- Construction of shed and planting fodder crops requires relatively high initial monetary and labour inputs;
- More day-to-day labour to grow, cut and carry the feed, and to fetch water;
- The maintenance of the shed and removal of manure requires extra labour;
- Lack of adequate exercise and availability of sunlight.

Requirements for zero grazing are primarily building materials, many of which come from local sources. For more extensive systems, some commercial source of lumber, cement, sand, gravel, posts and roofing material could be used. There is also the need for natural fodder or fields to grow fodder. Shed designs can be simple or complex. Basic requirements are an adequate perimeter to keep animals from breaking out, a roof for protection of all animals from the sun, a floor that can be easily cleaned and that drains away from the areas where animals lie down and stand and adequate space for feeding as well as a constant water supply.

What size? In the case of cattle, individual cubicles of about 120 cm wide × 210 cm long (4 feet × 7 feet) are best. Goats, sheep and pigs need approximately 2 m² of living space when confined to a pen.

Additional special features can be built into the zero-grazing sheds with separate sections for pregnant animals or the newborn, milking areas, larger animals kept from smaller animals and male animal segregation.
An adjacent paddock can be provided for animals to get out of the pen and move around.

Additional best practices for zero-grazing units:

- Provide as much water as the animals want to drink.
- Hang mineral blocks from the roof for animals to lick. Alternatively, powdered minerals can be placed in wooden boxes with an open top that are securely fastened in the feeding area.
- Cut fresh grass every day to feed to cattle. Make sure the feed troughs are never empty.
- Protect the stall from predators that are common to livestock in your area.
- If the region is very hot, extend the roof to provide a larger shaded area for cooling the air – but do not block natural air ventilation through the unit. This helps to dry manure and urine and reduce odours.
- If necessary, put straw in the pens as bedding for the animals.
- Make sure the animals have enough space for lying down, getting up and walking around. Keep the stall clean.
- Watch carefully for pests and diseases, and treat them early.
- Keep male animals separate but close to the females. Heat detection is easier when male animals are in close proximity to the females.
- Roadside grasses tend to have more pests such as ticks, and diseases such as foot-and-mouth disease. Avoid feeding this forage to the extent possible.

8: Improved Special Care

Special care is another effective way to reduce animal mortality in all kinds of livestock-keeping systems. Special care is especially relevant around birth and for individual animals with a disease or other problem (Table 10.8). In this way, the foundation is laid for a future healthy and productive life. This only requires special knowledge and attention, without the need for expensive constructions.

The recommendations related to special care in more specialized livestock keeping are divided into two parts: (i) special care for sick animals and disease prevention; and (ii) special care around delivery.

Special care for sick animals and disease prevention

Ways to provide special care for sick animals in low-input systems is described in
### Table 10.8. Comparing objectives and recommendations for improved special care in smallholder low-input and diversified livestock keeping (with more specialized animal husbandry).

<table>
<thead>
<tr>
<th>Special care</th>
<th>Objectives</th>
<th>Sick animals</th>
<th>Around delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-input and diversified systems</td>
<td>Increased survival rate of sick animal</td>
<td>Separate sick from healthy animals</td>
<td>Have animals nearby at birth</td>
</tr>
<tr>
<td></td>
<td>Reduced mortality of newborn</td>
<td>Shade, water, fresh feed</td>
<td>Attend birth when necessary</td>
</tr>
<tr>
<td></td>
<td>Reduced disease of females after birth</td>
<td>Ethno-vet treatment</td>
<td>Check afterbirth</td>
</tr>
<tr>
<td></td>
<td>Good bonding</td>
<td>Disposal of dead animals</td>
<td>Assure colostrum consumption</td>
</tr>
<tr>
<td></td>
<td>Reduced disease transmission of newborn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More specialized systems</td>
<td>Effective control of highly productive animals</td>
<td>Special care of young stock</td>
<td>Support to birthing difficulties</td>
</tr>
<tr>
<td></td>
<td>Young stock in good condition</td>
<td>Regular mastitis control</td>
<td>Milk fever prevention and treatment</td>
</tr>
<tr>
<td>Recommendations for improvement</td>
<td></td>
<td>Ethno-vet/commercial treatments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Isolate sick animals;
- Provide shade, fresh water, feed, and necessary treatment;
- Disposal of dead animals.

Additional recommendations for more specialized animal keeping are described below.

**Regular mastitis control**

Mastitis – or udder infection – is of special importance in more specialized animal keeping. Regular mastitis prevention activities can be included into milking practice.

**Special care before, during and after delivery**

Ways to provide special care for sick animals in low-input systems is described in detail in Chapter 9, and can be maintained and improved in more specialized systems (see below).

**Extra assistance around delivery**

This is especially important in more specialized systems – especially when AI is used. In this case, the young may be too large for a simple delivery. In the case of heifers (first delivery), it is better not to use AI for this reason.
Facilitate feeding with first milk (colostrum)

First feeding of milk needs to be assured within a few hours after birth. This milk with special antibodies – also known as colostrum – has special relevance to prevent disease in the first year of life. In order to have this quality it needs to be consumed during the first hours of life (Fig. 10.15).

Be prepared to treat milk fever

Milk fever is a common problem in more specialized dairy systems, which causes death within hours if not treated effectively. Because of calcium shortage in the blood, the animal cannot stand and feels very cold. A simple calcium infusion together with a follow-up treatment can save the animal. Special feeding adaptations during pregnancy can be taken to prevent this problem.

Check afterbirth

In both low-input and more specialized animal keeping, problems with the afterbirth can cause serious problems that need to be taken care of effectively.

Fig. 10.15. All newborn calves need their first milk within a few hours after birth as it contains important antibodies to prevent diseases. This is even more important in calves of the exotic breeds.

References and Further Reading

