



Livestock-Keeping and Animal Husbandry in Refugee and Returnee Situations

A Practical Handbook for Improved Management



UNHCR

United Nations High Commissioner for Refugees

IUCN

The World Conservation Union

LIVESTOCK-KEEPING AND ANIMAL HUSBANDRY IN REFUGEE AND RETURNEE SITUATIONS

**A PRACTICAL HANDBOOK FOR
IMPROVED MANAGEMENT**



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Glossary

Agricultural by-products – residues of processing agricultural products, e.g. oil-seed cakes, rice bran, molasses or brewery yeast.

Arid area – zone receiving less than 500mm rainfall annually (*cf semi-arid, sub-humid, humid areas*).

Brucellosis – a zoonotic, bacterial disease of all livestock species which is transmitted to humans through the intake of milk from infected animals. The disease, which causes undulating fever like malaria, is difficult to diagnose in humans. Symptoms in humans vary; different internal organs can be affected. In women, it can cause abortions. In men, inflammation of the testis is common. Boiling milk entirely kills the bacteria (*cf zoonosis*).

Carrying capacity – the number of animals which can be maintained on a given area of land without disturbing the equilibrium of plant growth and livestock production on the range.

Endemic diseases – diseases which occur in an animal population with predictable regularity. Disease events are not limited in time but in location (*cf epidemic diseases*).

Epidemic diseases – diseases which occur in an animal population in excess of its normal frequency of occurrence. Disease events are clustered in time and location, but tend to spread to other areas (*cf endemic diseases*).

Exotic breeds – non-indigenous livestock breeds (e.g. in Africa and Asia: European, American and Australian breeds, or breeds from other parts of the continent).

External parasites – parasites which live on the skin or in the fur of the animals.

Factorial diseases – diseases caused by micro-organisms which become pathogen only in times of additional stress (transport, harsh climate, nutritional deficiencies, etc.).

Humid areas – zone receiving more than 1,500mm rainfall annually (*cf arid, semi-arid, sub-humid areas*).

Internal parasites – Parasites which live in the blood, tissues or the gastro-intestinal tract of the infected animals (e.g. round and tape worms, trypanosomes etc.).

Pastoralism – system of agricultural production with emphasis on animals feeding on natural pasture (*cf transhumance*).

Prophylactic treatment – application of veterinary drugs to animals not showing symptoms of a particular disease. Prophylactic treatment is used to prevent outbreaks of disease or to reduce the economic impacts of diseases with high prevalence (e.g. treatment against parasites) (*cf external/internal parasites*).

Ruminants – livestock species which are characterised by their herbivore pattern of nutrition. By a system of several stomachs in which the forage is fermented, these animals can efficiently utilise the cellulose of plants which is unpalatable to humans and omnivores (pigs and poultry). The group of ruminants includes cattle, buffalo, sheep, goats, camels and several wild species (e.g. antelope and deer). Sheep and goats are also called “small ruminants”.

Semi-arid areas – zone receiving 500–1,000mm rainfall annually (*cf arid, sub-humid, humid areas*).

Soil-borne diseases – diseases that are caused by germs which are very resistant to harsh climatic conditions (e.g. heat and drought) and can survive for a long time in the soil.

Sub-humid areas – zone receiving 1,000–1,500mm rainfall annually (*cf arid, semi-arid, humid areas*).

Tragedy of the commons – an economic term describing a social process in which public goods are over-utilised by individuals. It was often used to describe over-exploitation of common property rangelands by individual livestock owners.

Transhumance – system of livestock production depending on seasonal migration of herds. This expression has replaced the better known

term “nomadism”, because it is now well established that most families migrating with their herds maintain a permanent living base to which they return regularly. Pure forms of nomadism, characterised by people and their herds moving constantly without local roots, rarely exists any more.

Tropical livestock unit (TLU) – unit which is used to compare the grazing requirements of livestock. One TLU equals 1 head of cattle (or 1 camel), or 10 sheep (or 10 goats).

Vectorial diseases – diseases which are transmitted by vectors (e.g. insects, snails, rodents, etc.).

Zoonosis – diseases which infect animals and humans, and can be transmitted from animals and humans (and vice versa).

Acronyms

FAO	Food and Agriculture Organisation (of the United Nations)
ha	Hectare
km	Kilometre
mm	Millimetre
NGO	Non-governmental organisation
OIE	Office Internationale des Epizooties
TLU	Tropical Livestock Unit
UNHCR	United Nations High Commissioner for Refugees

Executive Summary

Livestock are commonly kept in many refugee situations and, in many instances, form an important part of community activities. They are also a fundamental requirement in many returnee situations given the broad range of products which they can provide.

In addition to the selected products highlighted below, additional reasons for enhancing livestock-keeping practices in refugee and returnee operations include:

- limiting the negative impacts of certain animal species on the environment;
- reducing conflicts with local communities over resource use;
- developing livelihood security options for refugees and returnees;
- encouraging trade based on livestock-keeping;
- preventing outbreaks and the spread of diseases to other herds as well as to people; and
- ensuring that livestock products are safe for human consumption.

In both refugee and returnee situations, however, the circumstances governing livestock keeping may vary considerably - from being actively prohibited, to being tolerated or actually openly accepted in some formal sense. Wherever livestock are kept, however, one can reliably expect these to have some impact on the environmental, social and economic situations of refugees and returnee communities.

Although livestock-keeping has such a potentially important role to play in refugee-related situations through enhancing human welfare and providing livelihood security, in most instances livestock keeping is largely unregulated. In consequence, complaints are commonly aired by local people, especially with relation to competition for natural resources (grazing land and water in particular), as well as health and disease associated with livestock. Large animal herds are also often an attraction for bandits, whose presence in a refugee or returnee operation can destabilise events.

UNHCR's 1998 publication, **Livestock in Refugee Situations**, was the organisation's first step towards describing some of the common concerns relating to livestock issues in refugee settings. With new experiences and approaches being tried and recognised, however, this guideline is now too restricted in its coverage to provide ample assistance to staff and partner organisations responsible for advising on this significant issue. To reach a better understanding of what the most appropriate forms of livestock keeping and management might be for specific refugee operations, UNHCR has therefore developed this **Handbook on Livestock-Keeping and Animal Husbandry in Refugee and Returnee Situations**. Intended as a practical user-guide for selected range of practitioners, this Handbook is expected to fill an important gap in the management tools and guidelines available to UNHCR staff and implementing partners, in particular.

ANIMAL	COMMON USE	
	Food	By-products
Bees	Honey	Beeswax
Fish	Meat	Bones (fertilizer)
Rabbits	Meat	Skins, manure
Poultry	Meat, eggs	Manure
Pigs	Meat	Manure
Sheep	Meat, milk	Skins, manure
Goats	Meat, milk	Skins, manure
Cattle	Meat, milk, blood	Skins, manure
Camels	Meat, milk	Skins

For management purposes, and in order to avoid or minimise the level of environmental degradation and preserve relations with host communities and government agencies, the process of livestock-keeping and management, in particular, needs to be taken into account at the earliest possible stage of all refugee and returnee operations and reviewed regularly thereafter.

This Handbook is aimed largely at managers and generalists - not livestock specialists - the intention being to explain, using practical experiences where possible, some of the most common impacts associated with keeping livestock, to identify what concerns need to be

addressed, and to illustrate a range of options which might be taken or adapted to suit a particular situation. Particular emphasis is given to the fact that users of this Handbook will be working with people who may be already familiar with keeping livestock. Pastoralists from many African and Central Asian states, for example, have long traditional associations with livestock keeping and good animal husbandry practices. Users of this Handbook should therefore expect to learn from such people, but should also find themselves in a position where they might be able to assist and advise herders and others of options that might be available or better suited to a particular refugee or returnee situation.

1

Livestock Management in Refugee-Related Operations

1.1 Introduction

Livestock, which can be loosely defined as “cattle, horses, poultry and similar animals kept for domestic use, but not as pets”, play an important, if not fundamental, role in human society. In addition to the draught services provided by some of the larger varieties, many types of livestock are able to use products such as kitchen wastes, grass from roadsides and wastelands, and crop residues, all of which are unused by people, and provide multiple products in return. Meat, eggs, milk and skins are among the products most readily sought from livestock, while dung, urine and blood are commonly used as fertilizers for gardens, fields and fish ponds. Owning certain types and numbers of livestock is also associated with considerable social status in many groups, a fact that may outweigh – and on occasion complicate – any tangible, practical benefit stemming from keeping livestock in such situations.

During recent decades, many of the events that provoked refugee migrations took place in semi-arid and arid areas. Most of the refugees who fled from Afghanistan, Eritrea, Ethiopia, Mali, Niger, Rwanda, Somalia, Sudan and other countries belonged to pastoral groups whose household economy was traditionally based totally or predominantly on mobile livestock production, and whose cultural and social values centred on sheep, goats, cattle and

camels. In many of the relief operations which grew around these situations, a strong interdependence emerged between these displaced populations and the livestock they kept – to the extent that the latter have on occasion turned out to be the coping strategy most favoured by refugees, at the individual and family levels in particular.

Livestock-keeping is therefore a common occurrence in many refugee situations, with obvious social, economic and environmental implications, both positive and negative. Livestock are often also a fundamental consideration in repatriation programmes, many of which may involve the provision of livestock as draught or breeding animals, as sources of potential cash income, or as a more direct means of survival. The wise management of livestock – whether as an individual draught animal, a household flock of poultry, or a larger herd of grazing animals – would therefore seem to be an appropriate and systematic step to take in terms of generating or maintaining livelihood security in all refugee and returnee operations.

Livestock keeping by refugees or returnees, however, has considerable implications for local communities – many of which might already have substantial animal resources of their own. Nomadic communities too might suddenly find access to traditional resources denied or simply no longer available to them following the establishment of a refugee camp or settlement in a region where livestock-keeping is practised. Other issues of concern range from personal security (livestock are often the source of theft and internal conflicts) and disease transmission, to trade and food security.

Despite this importance, however, little direct support appears to have been directed towards the livestock sector, certainly in comparison with others such as forestry and agriculture. In 1998, UNHCR issued **Environmental**

Guidelines – Livestock in Refugee Situations, but little other guidance is available on how to plan or manage livestock in refugee or returnee operations. This is also reflected by the fact that only one direct reference to livestock can be found in a broad collection of environment-related lessons from refugee field operations over the past 15 years (Box 1). There would therefore seem to be a need to revisit this important aspect of how refugees – as well as local communities and the environment – might benefit from more systematic but appropriate management of livestock herds and flocks.

Box 1

An Environmental Study Should Be Undertaken Before Any Livestock Project Is Considered

Any intervention in the livestock sub-sector, whether re-stocking, the provision of water points or support to livestock health, will have environmental implications. There may, for example, be negative impacts on grazing areas or excessive demand on water supplies. Preliminary assessments of the likely impacts of any intervention, particularly re-stocking, are required.

UNHCR, 2002a.

Recent thinking, trials and experiences have resulted in a number of other approaches and practices being developed – many of which are based on traditional, indigenous farming systems. Programme managers, implementing agencies and field practitioners could benefit from knowledge of some of these practices.

This current Handbook is intended largely for practitioners and – by identifying what issues need to be addressed and what options might prove relevant to a particular situation – provides practical guidance on how livestock management might be improved in refugee and repatriation operations. As with many other aspects of humanitarian relief, however, no two

situations are likely to be the same, so that addressing the needs and opportunities relating to wise livestock management must be assessed and addressed on a case by case basis.

1.2 Livestock-Keeping in Refugee-Related Operations

Refugees may or may not be able to bring livestock, especially larger animals, with them as they flee their homes. Nonetheless, it is not uncommon for some form of livestock production to develop soon after the initial emergency phase has passed. As with crop production, livestock keeping is likely to form an important part of refugee/returnee community and livelihood activities. It may also serve to draw refugees closer to members of their hosting community, but could equally become the source of an additional conflict.

Keeping livestock will not be possible in all refugee operations (see Box 2), but it should be possible in the following settings, at least:

- ▶ **in and around camps or settlements**, where animals can be kept without the need for much land, but can still supplement the food basket and generate small amounts of income through;
 - **penned livestock in the home compound**, using small cages or enclosures to restrain livestock (usually poultry, rabbits, pigs and other small animals) which are fed on household scraps and locally available vegetation;
 - **free-ranging livestock** that are at liberty to wander in the vicinity of the home compound scavenging for food;
 - **herded livestock** that are kept outside camp limits, where they are grazed and watered; and

- **zero-grazed livestock** (often cattle or goats kept for milk) which are penned/ constrained and managed, but are provided with all of their food (collected from within and around the camp/settlement) and water *in-situ*.

- **in organised rural settlements** where livestock keeping is undertaken as part of the refugee/ returnee communities' subsistence or economic activities under agreed programmes of land use with local communities and authorities; and
- **in spontaneous settlements** in towns and villages, where refugees – to improve food security and perhaps generate some income – obtain access to land through their own arrangements with local people or communities.

Reasons for supporting livestock keeping activities among refugees and returnees are likely to include:

- improving food and nutritional security through eased access to fresh meat, milk, eggs, honey and other livestock-derived products, as well as greater possibilities for achieving self-reliance and retrieving self-respect;
- providing a basis for livelihoods in order to:
 - develop self-reliance;
 - reduce operating costs for humanitarian organisations (e.g. for relief food);
 - develop skills for future use; and
 - contribute to local and regional economies;
- providing transport as a means for moving produce, materials and people;
- providing power to ease land cultivation and improve agricultural productivity.

Box 2

Factors which May Influence Livestock-Keeping

Keeping livestock in a refugee or returnee context might depend on:

- the culture of the community – some tribes have a far closer association with livestock, or even certain types of animals, than others;
- the resources available to refugees or returnees: some may have their own animals from which they can breed or produce a valued commodity (eggs or milk for example);
- the climate and other prevailing ecological conditions;
- access rights to land for constructing animal shelters, as well as for grazing and watering;
- an individual's knowledge and skills to adapt his/her livestock management skills to a new situation, to identify possible openings for livestock outlets, or to be able to come to an amicable agreement with local communities, allowing him/her to engage in livestock keeping; and
- the possible economic and/or social benefits this practice might attract.

Other reasons to become involved in refugee livestock production processes, however, relate more to providing opportunities for guiding the development of livestock-keeping in order that:

- the scale and systems of livestock keeping adopted have minimal environmental impact;
- livestock production does not lead to conflict between host communities and refugees, either through competition for grazing or water, or damage to local crops and woodland; and
- maximum benefits are achieved in the refugee population, with particular benefits for the most needy.

Host communities are likely to keep livestock for similar reasons – as a source of food, a basis for economic activities and a source of power. There are further values associated with livestock, however, particularly among nomad and pastoralist groups for whom livestock have important cultural values and associations. In addition to representing a bank account “on-the-hoof”, large herds of cattle, sheep, goats and camels in rangeland areas represent an insurance against drought and disease, while cattle, in particular, are associated with many traditions, beliefs and ceremonies in many parts of the world.

In addition to working with refugees, returnees and host communities to improve their livestock management, pasture and rangeland management, and to improve productivity and reduce environmental impact, there are further reasons for involving these communities, including the need to:

- ensure that benefits accrue to host communities, through trade in animals and animal products;
- limit the impact and controlling the spread of livestock diseases and parasites. There is little value in controlling diseases in parasites in host community livestock if refugee livestock continue to be carriers;
- ensure that livestock products are safe for human consumption, and that refugees are not exposed to contaminated products, livestock transmitted diseases;
- develop business opportunities between host and refugee populations, based upon livestock-keeping, trade, processing and other value-adding, for mutual benefit; and
- establish an optimal balance in refugee and host community livestock populations to


ensure that environmental implications are minimised.

Despite the clear importance of livestock in these situations, this sector is possibly one of the least well understood or appreciated in most refugee or returnee operations. This Handbook is intended to help address this oversight by examining some of the most pertinent issues associated with keeping livestock in refugee-related situations, by examining possible options which might help improve livestock management in certain situations, and by providing practical guidance on how to assess needs and opportunities for any given situation.

Recognition is given to the fact that in some countries, host governments may allow – to varying extents – refugees to engage in livestock keeping activities, but in others these are actively discouraged or possibly even prevented by law. Similarly, the location of a refugee camp or settlement will influence what can and cannot be undertaken. While some form of livestock rearing can be practised in most rural situations, the physical siting of refugee camps and settlements, as well as their spatial arrangement and density, may make it impossible to practise conventional livestock keeping, which may give rise to herds still being maintained but at some other remote location.

If livestock keeping is an option, this Handbook provides guidelines for thinking through and planning activities that will support appropriate and environmentally sound livestock management and animal husbandry practices. Specifically it should help users:

- recognise what policies and regulations exist and what actions are permitted;
- work out what livestock people want to keep, and for what reason(s);

- 
- become aware of some of the positive and negative impacts associated with livestock-keeping;
 - determine what species are most suited to a particular situation;
 - decide what approaches and techniques are the most appropriate; and
 - translate some of the practical guidance contained in the various sections into practice.

2

Purpose and Use of this Handbook

2.1 Introduction

With a growing appreciation of the importance of many forms of livestock among displaced populations, but realisation of the considerable and often lasting impacts this can have on the local environment and socio-economic situation, a new focus is being placed on livestock keeping by refugees and returnees, and the interactions it may have with local communities.

This Handbook has been prepared to help develop a better understanding of what needs to be considered when dealing with livestock production and management in a refugee or returnee operation. Based on existing guidelines (UNHCR, 1998), it takes a fresh look at some of the main recurring issues experienced in planning for and managing livestock herds, describes some recent experiences in this arena and outlines a number of livestock-keeping and animal husbandry options which might be considered in a particular situation – all with a view towards enhancing management systems and reducing the negative environmental and social impacts often associated with livestock keeping.

The Handbook examines a range of specific issues related to keeping livestock, explores opportunities to minimise environmental impacts and provides guidelines for developing locally appropriate initiatives. It is written with a focus on:

- ▶ the needs and rights of refugees, returnees and the communities among whom they are living, to use livestock as a possible means of improving their livelihoods;
- ▶ improving current livestock management practices and systems in refugee and related operations through, *inter alia*, linkages with other sectors and environmental activities that might be planned or already underway;
- ▶ identifying opportunities which might arise allowing these affected communities to engage more openly and effectively in the livestock sector; and
- ▶ minimising environmental problems frequently associated with agricultural activities in refugee-related settings.

The Handbook provides a summary of key issues and some practical guidance for the livestock sector in refugee and returnee situations – a sector which is often overlooked in humanitarian operations, but is nonetheless of considerable importance to displaced people as well as to host communities.

2.2 Using this Handbook

As with other titles in this series, this Handbook is designed for programme and technical staff of UNHCR, both in the field and Headquarters, and its implementing partners. In particular it is intended for project managers, planners and trainers (who may not be specialists in agriculture or natural resource management). The Handbook will also be relevant to individual refugees and local people who practise some form and scale of livestock-keeping, but it cannot be expected to reach this level in every case.

The Handbook is intended to be relevant to different situations, ranging from pre-emergency/ preparedness planning to an emergency, but will most commonly be of use during the care and maintenance phase, longer-term resettlement arrangements and in returnee situations. It addresses equally the needs of refugees, returnees and the local population, among which the former may be living.

Not all of the Handbook will be relevant to all readers – different parts may be more useful to those with different roles and responsibilities. However, it is expected to be of assistance to:

- managers and planners as an introductory tool to help introduce the main issues relating to livestock keeping and good husbandry practices within the limitations under which they work. Important sections of the Handbook are possibly those describing basic consideration and options for livestock keeping (Section 3);
- for practitioners, including refugees and returnees, who themselves can review possible options and adopt or modify these accordingly when they see a window of opportunity for improving local environmental conditions (Section 4 and Annex 1); and
- for implementing partner field staff, trainers and extension agents the Handbook provides an additional section on how to assess the situation on the ground and how to put much of the theory into practise (Section 5).

Users of the Handbook are cautioned that while the information provided in the following sections should help them make judgements based on careful processes of data and situation

analyses, this is no replacement for practical knowledge of livestock keeping and good animal husbandry. While true in many situations, it is especially relevant in relation to the livestock sector, and nowhere more so than in dealings with pastoralist communities.

To further benefit from this Handbook it will be useful if a number of resources and skills are available, including:

- some knowledge and experience of livestock production and relevant cultural and environmental issues;
- an open approach towards livestock management and production, particularly in terms of identifying innovative and more environmentally sound approaches towards managing this sector;
- an understanding of project design and management – especially important to prevent livestock issues being dealt with in isolation;
- resources for accessing the Internet and/or obtaining other useful publications. To be effective, this Handbook cannot be comprehensive in its coverage of detail, so it identifies other literature and points of reference where more additional information might be obtained; and
- funds, or the potential for funding, for specific activities. Typical project/programme costs might include training and extension, equipment, medicines for livestock welfare, as well as animals themselves, many of which might not be covered within existing humanitarian support budgets.

3

Livestock Management: Some Basic Considerations

3.1 Introduction

Livestock can play an integral part in the welfare of many families and communities. While the basic characteristics of keeping and caring for animals should not vary much between a stable community and people living in a refugee or returnee context, what can be expected to differ is the conditions that allow, or prevent, the keeping of livestock, especially larger animals. Space allocation alone will determine if any livestock can be maintained around a homestead. The availability of forage and water too will determine what, if any, form of livestock-keeping might be practised. Added to this, however, may be local restrictions on keeping livestock, perhaps for a range of reasons such as a fear of disease outbreaks, or cultural taboos. The presence of additional livestock may also lead to excessive use of forage sprouting after the rains, thus reducing the availability of dry season forage for local community use. Additional concentrations of livestock also require more water, and local sites of high biological diversity can be put under pressure if herd sizes suddenly increase.

Many economic and livelihood security decisions revolve around the livestock herd. Livestock are important for subsistence needs, but most pastoral systems are also well integrated into the market economy of their countries. Livestock products such as milk, meat and eggs provide high quality protein for human nutri-

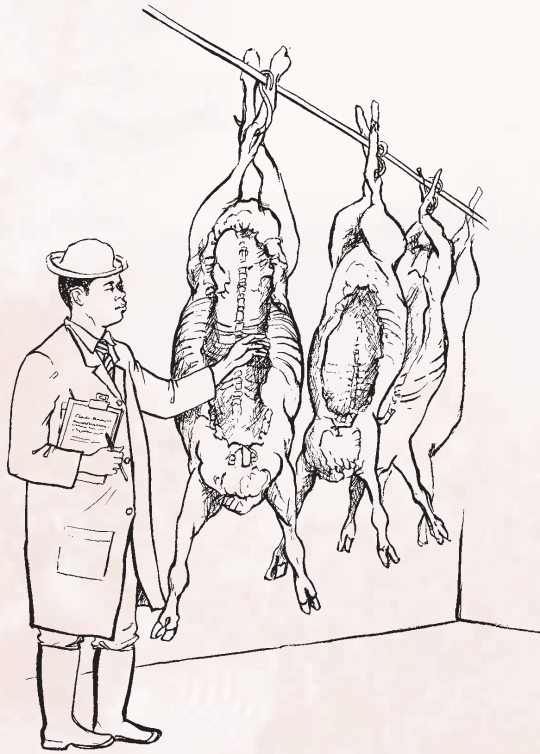
tion. In traditional societies, most of the produced milk is consumed within the family, while cash is generated from the sale of live animals. Livestock herds are thus commonly treated as capital assets and the size of the herds is related to risk minimisation. A herd of 40 to 60 sheep and goats, or 5 to 10 head of cattle is the minimum subsistence level for a poor household of two adults and one or two children. If animal numbers fall below this range, production becomes unviable, and households may be forced to abandon the pastoral sector.

Planners, in particular, must recognise and respect traditional land-use systems. Pastoralism is not, as some may consider, an outmoded livelihood system, but is a very efficient method of livestock production and a key strategy for many communities to overcome drought and fodder shortages in marginal and semi-arid rangelands. The inappropriate siting of refugee camps or settlements, leading perhaps to vegetation loss as a result of collecting fuelwood and building materials, as well as grazing and browsing by refugee livestock may disrupt traditional resource use and management systems, and impact on important seasonal grazing lands. This can be catastrophic to host communities reliant on their livestock, affecting their livelihoods and providing a basis for antagonism and hostility between the host community and refugees.

Some basic considerations outlined below need to be addressed at the outset of a refugee or returnee operation: findings from these will help shape decisions relating to possible livestock management.

3.2 Traditional and Legal Rules and Regulations

All interventions related to refugee livestock have to consider the laws and regulations of the host country. These include:



Meat inspection for health purposes

- traditional grazing and watering rights;
- access rules and land tenure rights;
- laws of the veterinary service;
- regulations regarding movement of animals and quarantine;

- regulations on notifiable diseases;
- import rules for veterinary drugs and vaccines;
- rules for meat inspection; and
- market regulations.

Although it might at first seem arduous to have to consider all of these issues before deciding how to approach the livestock management issue, these are among the most basic essentials, knowledge of which will determine and shape the entire prospect of keeping livestock in a refugee or returnee situation.

3.3 Livestock to Suit the Conditions

Keeping livestock of a particular breed or breeds may not be possible in all situations, primarily on account of the prevailing ecological conditions, rainfall being one of the most decisive. Social conditions may also influence decisions on what animals to keep: pigs-keeping, for example, will be frowned upon by Muslim people, while others may have a strong traditional affinity to keeping only cattle of one breed. An indication of what forms of indigenous stock keeping can be expected to be sustained in sub-Saharan Africa is shown in Table 1.

Table 1. Types of indigenous stock keeping in sub-Saharan Africa (Ogle, 1998)

<i>Rainfall (mm/year)</i>	<i>Predominant type of farming</i>	<i>Main species kept</i>
<50	Occasional nomadic stock keeping	Camels
50–200	Nomadism with long migrations	Camels
200–400	All types of nomadism, transhumance with some arable farming	Cattle, goats, sheep
400–600	Semi-nomadism, transhumance, but more emphasis on arable farming	Cattle, goats, sheep
600–1,000	Transhumance and partial nomadism, even more emphasis on crops	Cattle, goats
>1,000	Sedentary agriculture (semi-nomadism only the result of tradition)	Cattle, goats, monogastrics

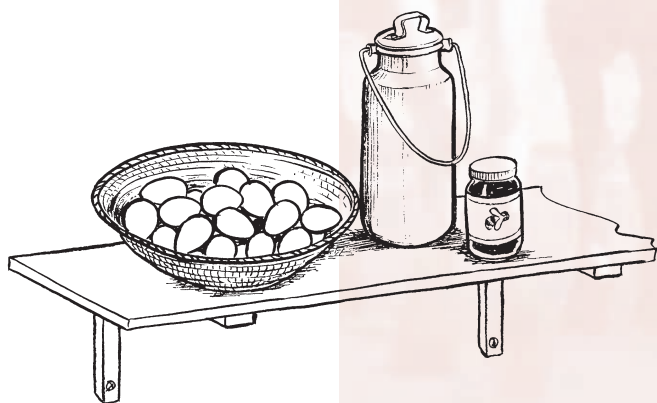
3.4 Impacts Commonly Associated with Livestock-Keeping

A fundamental concern relating to livestock-keeping and animal husbandry is the impact this activity will have not only on the immediate environment but also in relation to social and economic issues. Careful assessment will need to be made to identify the most likely impacts of specific forms of livestock keeping and husbandry. Such information can then be used to try and regulate livestock management practices for the benefit of all concerned (see for example Box 3).

A decision on whether to allow livestock in or around refugee settlements (see also Section 4), has to be made by weighing positive and negative effects together, and by taking into consideration certain rules and regulations (Section 3.2). The following remarks should be used as a guide for decision making.

3.4.1 Some Positive Impacts of Livestock-keeping

While not necessarily refugee specific, the following positive aspects of good livestock management practices should be noted.



Livestock products – positive impacts

Box 3

Livestock and Crop Production

Agro-pastoralists in Nigeria use the hoof action of livestock to prepare land for growing small cereals. By concentrating cattle on a small area of cleared land, the earth is gradually broken into smaller fragments through continued trampling. This reduces the level of manual labour required to prepare the soil – seed can simply be broadcast over the broken soil surface the following morning.

In a similar example of wise livestock management, farmers in parts of the Near East use goats to weed crops. While this might initially seem like a recipe for certain disaster, the key to this strategy is to allow the goats to satisfy their initial appetite on natural pasture and only then to move them into cereal fields where they will selectively eat the herbaceous weeds.

Source: Based on Reijntjes, Haverkort and Waters-Bayer, 1992.

Fertilization of soils. Livestock manure is a valuable fertilizer that is widely used to improve crop production. The use of animal manure reduces the amount of artificial fertilizer necessary which, while saving money and adding nutrients to the soil, also helps preserve the soil structure. Excessive collection of cow manure for use as a fuel source can deprive the soil and plants of valuable nutrients.

Stimulation of plant growth. Modest grazing – which almost invariably requires close herding and co-ordination between herders – and the associated disturbance of ground cover, can stimulate the growth of certain plants.

Reduction of water run-off. The stimulation of plant growth on rangelands reduces the risk of soil erosion, as long as stocking rates are appropriate to the available biomass.

Efficient use of natural resources. Many crop by-products and residues from processing agricultural products can be used for animal

feed – an efficient use of resources that have little other practical value.

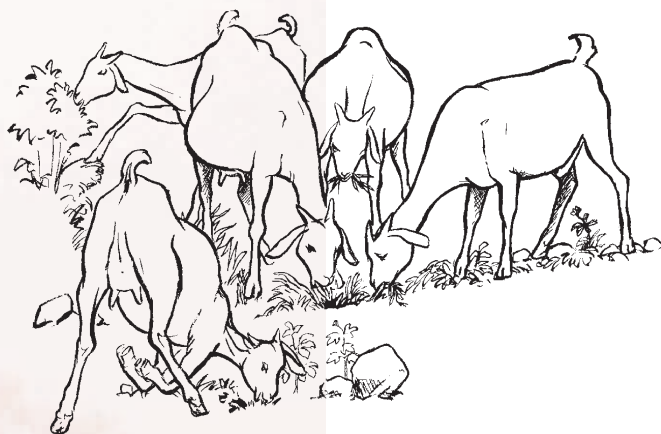
Savings in renewable and non-renewable resources. Livestock can help save renewable and non-renewable energy resources (fuelwood, petrol or diesel fuel) by providing:

- ▶ draught power – cattle, buffalo, donkeys and camels can be used as draught animals in agriculture and transport, e.g. for operating oil mills, drawing water or ploughing small gardens; and
- ▶ fuel – animal, particularly cattle, dung when dried is used for cooking and heating in many parts of the world. Manure is also the main input for biogas plants, which can be used to produce gas for cooking and lighting (see UNHCR 2002b).

Food and income generation. Livestock provides valuable food for human nutrition, particularly in pastoral societies where dairy products are available. The availability of animals as a food source can help reduce the amount of food required from outside sources during the emergency and care and maintenance phases (see also Box 4). As noted in many parts of this Handbook, livestock production is also one of the best options for promoting food self-sufficiency among refugees and returnees.

3.4.2 Some Negative Impacts of Livestock-keeping

A number of concerns will come to the fore in refugee operations, particularly in situations where refugees bring their livestock herds with them. These concerns will vary considerably depending on the local situation – mainly with regards to local ecological conditions, social systems and existing stocking practices. Some of the possible impacts, which can tend to outweigh the positive benefits noted above, are listed below.



If not controlled, animals can cause damage to trees and crops

3.4.2.1 Impacts on Natural Resources

Deterioration of plant cover/overgrazing. An increased number of animals can have negative impacts on rangelands and crops, and can potentially lead to serious land degradation. Serious overgrazing and deterioration of plant cover through trampling can be observed generally around refugee camps and other settlements, watering places and animal markets. With growing animal numbers, the carrying capacity of the rangelands can be exceeded and the productivity of the grazing animals and the land will be reduced. If not well managed, animal herds can also partly or totally damage unprotected fields by eating crops and through trampling.

Cutting of bushes and trees. Livestock herders frequently cut bushes and trees to construct temporary night enclosures for their flocks. Foliage may also be cut from trees as animal fodder. Both activities can be a significant contribution to localised deforestation.

Destruction of seedlings and trees. If unprotected, tree seedlings and young saplings will be eaten by livestock, especially goats. Few seedlings will recover once they have had their growing shoot removed.

Box 4

Contribution of Food and Food-Related Products to the Total Value of Livestock Production (Ogle, 1998)

The importance of some simple services provided by certain livestock species is often ignored. In East Africa, however, estimates show that the value of manure and animal traction equals the value of meat (see below). If extrapolated to the sub-Saharan region as a whole, this figure would increase the total gross value of livestock products by about one-third. As mixed crop-livestock systems (see Section 4.4) expand the relative importance of animal traction and manure will grow.

Output	Percentage of gross value of output				
	West Africa	Central Africa	East Africa	Southern Africa	Sub-Saharan Africa
Animal traction	21	3	39	26	31
Manure	4	1	3	2	3
Meat	56	79	38	58	47
Milk	11	12	17	9	15
Eggs	8	5	3	5	4
Total	1,460	349	3,747	930	6,486

Reduction of biodiversity. Many traditional societies have developed particular rules to regulate the co-existence of livestock and wildlife. In refugee and returnee situations, where conditions are rarely as stable as with normal society, increasing and increased livestock production on rangelands is likely to have a negative impact on local flora and fauna, particularly through increased competition for vegetation and water resources. Habitat loss, alteration and fragmentation – all resulting from overgrazing – can eventually contribute to species extinction.

Depletion of water resources. In refugee settlements, water resources are often limited. Without timely and strict control, the presence of large animal herds can contribute to the depletion and pollution of these resources.

3.4.2.2 *Social Conflicts*

Disruption of traditional livestock production patterns. In most parts of Africa and Asia, people have developed well adapted patterns of land-use. In situations where people migrate

with their livestock to other countries, continuation of this type of production becomes unviable. The consequent loss of herds implies a strong psychological dilemma for refugees who lose possibly the only economic base they are familiar with and, perhaps more seriously, the focus of their family life and culture.

Competition for rangelands. Refugee livestock compete with local herds for limited resources. With an increased overall density of grazing animals the production of local herds may decline.

Conflicts with local population. Competition for rangeland and the destruction of crops is a relatively frequent reason for conflicts between refugees and the local population. If land tenure and grazing rights are violated, traditional grazing systems will be affected and imbalanced.

3.4.2.3 *Impacts on Public Health*

Water pollution. Uncontrolled watering of animals bears the risk of transmission of



Cattle if not well managed can cause damage to crops

diseases from animals to animals and from animals to humans, through water pollution with animal faeces.

Air pollution. In certain conditions, the movement of large number of animals in refugee camps/settlements produces dust that can be a cause of respiratory diseases in humans.

Slaughtering wastes. The uncontrolled slaughtering of animals in refugee camps or settlements is a threat to human health, particularly if proper storage and cooking of meat is not possible. Slaughtering wastes can also pollute the soil and water if not disposed of correctly.

Health hazards caused by uncontrolled use of veterinary drugs. If veterinary drugs are provided to refugees, control over their application has to be ensured. Many drugs used for prophylactic and clinical treatment of livestock may have negative impacts on the health of humans. For example:

- externally applied solutions of acaricides (drugs used to eliminate external parasites) may contaminate the soil, food and food storage containers; and

- most drugs are stored in the body tissue of the animals treated (i.e. in the fat and meat), and are partly excreted with the animal's milk. People consuming the meat or milk of treated animals within a certain period of time after application – which is specific for each drug – also ingest a small amount of these drugs, which can produce unwanted, and potentially serious side-effects.

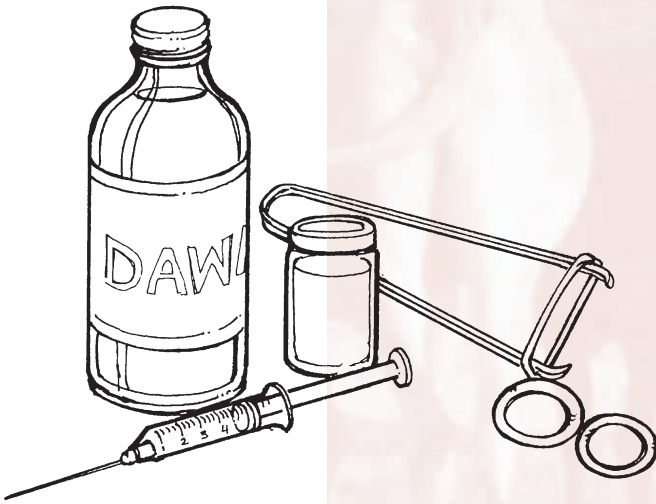
Disease transmission. In refugee settlements, the transmission of zoonotic diseases from animals to humans is nurtured by the closeness of animals and humans (Table 2). Malnourishment, stress and diseases that weaken the human immune system aggravate the impact of zoonoses.

At the same time, a number of other diseases – some of which can reach epidemic proportions if not controlled in time – are transmitted directly from animal to animal or via a separate vector such as ticks or biting flies. Further, more specific, information on diseases is given in Section 3.5.

3.5 Disease Avoidance and Control

Good animal health is essential for successful farming. Veterinary care in terms of prevention can greatly help improve livestock production but this is usually an expensive undertaking, often beyond the reach of many refugees or returnees. In traditional livestock systems, cattle owners try to avoid problems from occurring in the first place using a combination of approaches which could be applied simply to refugee-related situations. These include:

- using indigenous veterinary medicines; and/or
- learning to cope with disease by spreading risks, e.g. through keeping mixed herds, by using animals tolerant to local diseases, and by avoiding flock/herd mixing with others.



Inputs required for animal health

3.5.1 Common Livestock Diseases

People are often at risk from contracting disease from livestock, a situation which is only reduced or prevented if good animal husbandry

practices are put in place and regularly monitored. Some of the most important diseases which can be transmitted from animals to humans – zoonosis – are shown in Table 2.

The spread of diseases from one animal to another is one of the main risks when livestock from different areas mix. If not vaccinated, animals brought in from other regions tend to have hardly any resistance to local diseases. Diseases may be of an epidemic nature, or may be vector or soil borne. The main epidemic diseases prevalent in Africa and Asia are listed in Table 3.

In longer term settlements – protracted care and maintenance operations, for example, careful consideration should also be given to the fact that refugees may acquire additional income which will be used to buy new, local animals. This will result in the mixing of local and “imported” livestock – a common practice that can potentially spread disease.

Unlike the above, vector or soil-borne diseases are not transmissible from one animal to another. Intermediate hosts such as mosquitoes, ticks, fleas and flies carry the infective agents of vectorial diseases. The causative agents of soil-borne diseases survive in the soil for a long time and can infect animals through wounds or if the animals feed on infected areas. In such cases, disease pressure is closely related to the density and the species of the vector. The main important vector and soil borne diseases are listed in Table 4.

In Africa, the most important vector-borne disease in terms of economic losses is trypanosomiasis – bovine sleeping sickness – found in major parts of sub-humid Africa, but not in the semi-arid and arid parts of the continent. It is transmitted by tsetse flies. Herds will be affected up to 100 per cent if moved from a tsetse-free to a tsetse-infested area.

Table 2. Diseases which can be Transmitted from Animals to Humans

Disease	Main Host	Mode of Transmission
Human and bovine tuberculosis	Cattle	Directly (air, milk)
Brucellosis	Cattle, goats, sheep	Milk, wounds
Anthrax	Cattle, sheep, goats	Meat
Salmonellosis	Cattle, poultry	Faeces
Cryptococcosis	Poultry	Air
Trychophytiasis	All animals	Contact
Rift Valley fever	Cattle, sheep, goats	Contact (wounds)
Parapox (Orf)	Goats	Contact
Rabies	Dogs, cats, cattle, sheep, goats	Bites, wounds
Echinococcosis	Dogs	Faeces
Tape worms	Cattle, pigs	Meat
Fleas and mites	All animals	Contact

Table 3. Important Epidemic Livestock Diseases in Africa and Asia

Name of Disease	Species Mainly Affected	Vaccination Available?
Rinderpest	Cattle	Yes
Small ruminant pests	Sheep, goats	Yes
Contagious bovine pleuropneumonia	Cattle	Yes
Contagious caprine pleuropneumonia	Goats	Yes
Foot-and-mouth disease	Cattle, sheep, goats, camels, pigs	Yes
Pox diseases	Cattle, sheep, goats, camels, poultry	Yes
European swine fever	Pigs	Yes
African swine fever	Pigs	No
African horse sickness	Horses	Yes
Glanders	Horses	No
Newcastle disease	Poultry	Yes

Note: most of these diseases are caused by viruses and no treatment is available. They are either per-acute, i.e. animals die instantly, or acute - high mortality rates must be expected. Antibiotic treatment can be effective for the cure of contagious bovine pleuropneumonia and contagious caprine pleuropneumonia.

Beside transmitting diseases, biting insects themselves can become a constraint to livestock production. Biting flies and ticks, in particular, which suck blood, depress growth and milk production.

One way to overcome or prevent these vector-borne diseases is to use insecticides in so-called cattle dips. This allows farmers to maintain animals with higher production levels because natural resistance tends to be at the expense of milk and meat output, but is only useful in the short-term and does not have a lasting impact on the tick population or the disease. In addition, ticks develop resistance to acaricides. Local species of cattle and goats, however, have more genetic resistance to these micro-organisms than exotic breeds with higher milk or meat yields, so it is worth investing in such species from the outset. Notice should also be taken of the Food and Agriculture

Organisation's (FAO) strategy on ticks and tick-borne diseases programmes which aim to promote integrated tick and tick-borne disease control methods that include immunisation, when applicable, and increasing peoples' awareness about resistance of ticks to acaricides (see also Box 5).

Factorial diseases are caused by micro-organisms or worms, which are carried by most animals without causing any harm. Under normal conditions, livestock develop mild resistance to these diseases. However, if additional stress is imposed on the animals, for example through food shortages or forced movement over long distances, the animal's susceptibility to these diseases increases and the animals begin to exhibit clinical symptoms. A typical example is pasteurellosis, more commonly known as "shipping disease" – a disease caused by bacteria (*Pasteurella*). If well-managed, animals infected

Table 4. Important Vector or Soil-borne Livestock Diseases in Africa and Asia

<i>Name of Disease</i>	<i>Species Mainly Affected</i>	<i>Mode of Transmission /Vector</i>	<i>Vaccines available?</i>	<i>Treatment/mode of application of drugs</i>
Bovine trypanosomiasis	Cattle	Tsetse fly	No	Trypanocides (injection)
Surra (trypanosomiasis)	Camels, horses	Biting flies	No	Trypanocides (injection)
Anaplasmosis	Cattle	Ticks	No	Different injectable drugs
Babesiosis	Cattle, sheep, goats	Ticks	Yes	different injectable drugs
Theileriasis	Cattle	Ticks	Yes	different injectable drugs
Heartwater	Cattle	Ticks	No	antibiotic (injection)
Rift Valley fever	Cattle	Ticks	Yes	antibiotic (injection)
Equine encephalomyelitis	Horses	Mosquitoes	Yes	none
Bluetongue	Sheep	Mosquitoes	Yes	none
Infectious kerato-conjunctivitis	Cattle, sheep, goats	Flies	No	antibiotic (injection)
Anthrax	Cattle, sheep, goats, camels, horses, pigs	Soil	Yes	none (per-acute disease)
Enterotoxaemia	Sheep, goats, cattle	Soil	Yes	none (per-acute disease)
Blackleg	Cattle, sheep	Soil	Yes	none (per-acute disease)
Black disease, Bradsot	Sheep	Soil	Yes	none (per-acute disease)

Box 5**Traditional Means of Animal Disease Transmission**

One proven means of protecting livestock from vector-borne disease is to avoid areas of high risk in certain periods. For example, Fulani cattle keepers in the sub-humid zone of West Africa avoid infested grazing areas and minimize the time spent at watering points where vectors are most likely to occur. In the wet season, grazing is delayed until late in the morning, as worm infestation on grass is highest early in the morning. Fires are built next to cattle pens to keep away biting insects at night and, when outbreaks do occur, the livestock owners avoid infected areas.

FAO. 2001

with these germs do not normally get sick, but outbreaks appear typically after animals are crowded for transport, and during cold and wet seasons (Table 5).

3.5.2 Maintaining Animal Health

A healthy animal has a much better feed conversion rate, so it makes sense for any livestock owner to ensure that his/her animals are always in the best of shape. While disease prevention is the favoured means of preventing an animal or herd/flock of animals from contracting a disease in the first instance, it is often beyond the reach of an individual or community to do this – especially in a refugee context.

The supply of veterinary inputs and provision for animal health are the most important and cost-efficient interventions needed to improve the productivity of refugees' livestock herds. Improving the health status of animals therefore increases the carrying capacity of rangelands and results in a higher productivity per hectare of land. The implementation of mass prophylactic campaigns, i.e. vaccinations and preventive anti-parasitic treatment, needs an economic assessment which considers the cost/benefit ratio of specific disease prevention or eradication campaigns and alternative strategies.

In some situations it will be obvious that veterinary intervention is the best or only option. On other occasions, however, it might be more appropriate to consider possible alternative strategies for disease control. Questions which assist in the evaluation of priorities for alternative disease control strategies can be found in Annex II. Among the strategies which might be considered to help prevent, control and/or reduce disease include:

- control of movement (border control, import restrictions, control of border districts, issuance of health certificates, control of livestock markets). In most cases related to a sudden influx of large numbers of refugees with their animals, control of movement is difficult to implement;

Table 5. Factorial Livestock Diseases in Africa and Asia

<i>Name of Disease</i>	<i>Species Mainly Affected</i>	<i>Vaccines available?</i>	<i>Treatment/mode of application of drugs</i>
Pasteurellosis	Cattle, buffaloes, yaks	Yes	Antibiotic (injection)
Foot rot	Cattle, sheep	No	Antibiotic (spray)
Mange	Sheep, goats, camels, cattle	No	Acaricide (dipping, spraying, pour-on)
Coccidia	Cattle, sheep, goats, poultry	No	Sulfonamide, other coccidiostatica (injection or via feed)
Round worms	All species	No	Anthelmintics (drenching, boli, injection)

- control of individual herds (restriction of purchases and sale of animals, fencing, disinfection, quarantine, destruction of infected animals or animals at risk, disposal of dead/slaughtered animals);
- monitoring of diseases;
- vaccination and prophylactic treatment; and
- vector control.

Once such an assessment has been carried out, a number of options should then be available, including the following.

Vaccination campaigns. If planned properly, vaccination campaigns have the highest cost/benefit ratio of all veterinary interventions. Endemic and epidemic diseases caused by viruses, such as rinderpest or foot-and-mouth disease, can only be controlled by vaccination. The kind of vaccination programmes which need to be applied can only be decided on the basis of the experience of local veterinarians. Plans for mass vaccination campaigns can also be discussed with the World Organisation for Animal Health – Office Internationale des Epizooties (O.I.E.) (http://www.oie.int/fr/fr_index.htm), which can advise on the necessity and feasibility of options. If disease outbreaks with a high number of fatal cases are reported, the disease should be investigated and certified by a recognised specialist.

Prophylactic treatment against endo- and ecto-parasites. The second kind of mass treatment relates to strategic anti-parasitic treatment. Animals that are free from internal and external parasites have a higher chance of surviving nutritional stress and are less susceptible to infectious diseases. Treatment against internal and external parasites increases the feed conversion rate and therefore the carrying capacity of the range. Depending on disease prevalence, other options include prophylactic treatment

against trypanosomes, babesiosis and theileriosis. The main options for parasite control are:

- control of endoparasites (round and tape worms) – strategic deworming; and/or
- control of ectoparasites (ticks, mites, fleas, flies) – dipping, spraying, pour-on acaricides.

Control of trypanosomiasis. The options to control trypanosomiasis can be categorised as follows:

- control of the vectors – tsetse flies: aerial spraying with insecticides and clearance of the vector habitat (bushland) are economically and environmentally questionable and should only be implemented after careful consideration of all other options, including the option of doing nothing. An environmentally friendly, but labour intensive method is the application of fly traps that are impregnated with natural substances attracting flies. Another technique is based on the distribution of a high number of male tsetse flies that have been sterilised through radiation; and/or
- chemotherapy and chemoprophylaxis: prophylactic treatment of animals with trypanocides is economically justified only in cases of very high disease pressure. Treatment of sick animals has a significant positive effect on the productivity, particularly of milk animals.

Community animal health care. Any operations that support livestock production of refugees should include training programmes for community animal health workers. Trainees should be selected from the refugee community. Their main duties should be related to parasite control (application of deworming drugs and acaricides against insects). If properly trained, they can, under the supervision of a

veterinarian, also assist in vaccination programmes. Their function in curative treatment of individual animals is limited to certain diseases like wounds, simple gastro-enteral disturbances and light infectious diseases. The application of injectable drugs like antibiotics and trypanocides should be restricted, because inappropriate application can have negative effects on the animals, but also on humans consuming the milk and meat of treated animals.

Besides preventive and curative treatment, community animal health workers carry out other important tasks. They act as extension workers and, if trained in simple monitoring techniques, as key informants on livestock development and disease outbreaks.

Traditional treatment. All livestock producing societies have a rich culture of traditional wisdom on the treatment of sick animals. This can be used to save resources and to develop a spirit of trust with the refugees. Traditional healers should be identified among the refugee or host population and they may be trained as community animal health care workers.

Traditional treatment offers a viable alternative to conventional western-style veterinary medicine, especially where the latter is unavailable, unaffordable or inappropriate. Such ethno-veterinary medicine can provide low-cost health care for simple animal health issues, although it tends to be ineffective against infectious diseases.

Many of the plants used in animal health care are easily available, but non-plant substances are also used. For example, warm stout is given to animals after they have given birth to help remove the afterbirth, while cobwebs are used on cuts to help stop bleeding. Some of the plants used are multipurpose such as guava (*Psidium guajava*), bamboo (*Bambusa vulgaris*), rice

(*Oryza sativa*), turmeric (*Curcuma longa*), aloe (*Aloe vera*), banana (*Musa spp.*) and *Kalanchoe pinnata*. These plants are either already found on farms or they can easily be grown. Many of these plants also have a food value. For example, an excess of green bananas can be ground, boiled and fed to stock as a source of carbohydrates and iron. Guava fruits and leaves contain useful vitamins. *Cymbopogon citratus* and *Ocimum gratissimum* can be used to make delicious teas. Medicinal plants to treat ruminants are used mainly for internal parasites, internal and external injuries and pregnancy-related conditions. Farmers usually boil the plants to



Maintaining animal health through veterinary services

make a decoction. Other plants are administered as teas, in which water is boiled and thrown on to the fresh leaves, which are then left to steep. The resulting infusion is then administered once or over a period of days. Bamboo joints, thin-necked bottles or other appropriate instruments are used to drench the animals. As with any technology, however, care has to be taken in the use of indigenous medicine and application of knowledge. Nonetheless, more attention to the potential of these approaches is likely to unlock a vast area of useful knowledge for conditions where modern medicine is out of reach (FAO, 2001).

3.5.3 Avoiding Negative Impacts on Public Health

Public health issues should remain a priority concern wherever livestock-keeping is being practiced or considered in refugee or returnee operations. A broad range of factors need to be considered from the basic fact that many domestic animals attract flies and other disease-carrying insects, to the transmission of diseases from animals to humans, to the safe use of veterinary drugs, as described below.

Careful use of veterinary drugs.

Veterinary drugs should be applied only by trained staff. Since the toxicity of drugs varies, the following drug-handling precautions are recommended:

- community animal health care workers can apply wound treatment, drugs against worms, and some kinds of acaricides. The first two types of drugs can even be handed out to informed farmers, if no trained staff are available;
- most acaricides are very toxic, and should only be administered by well-trained personnel, who should wear plastic gloves for protection;

- antibiotics and other anti-infective drugs should be applied by veterinarians, or in absence, by para-vets;
- dips for mass treatment of animals against ecto-parasites should be located in some distance from settlements, protected against leaking, and administered by trained personnel;
- all drugs have to be stored out of reach of children, and household training courses should convey messages on their potential toxicity.

Abattoirs. Slaughtering of animals in refugee settlements should be strictly limited to confined slaughtering places. These places should be established at the periphery of the settlements. Before establishing a small-scale abattoir, the problem of waste disposal has to be solved. Most by-products from slaughtering can be converted into animal feeds, if properly sterilised, dried and ground. Manuals for designing small-scale feed mills are available from the FAO (www.fao.org). All slaughterhouse wastes that are not used must be dumped a safe distance from the settlement and, if possible, burned. If burning is not feasible, the disposal pits must be at least two metres deep.

Separation of water points for human and animal consumption. Because of the risk of contamination, watering places for humans and animals have to be strictly separated. Wells which supply water for human consumption should be surrounded by a wall or fence to keep animals out. Livestock watering places at rivers should be located downstream from the camp and settlement areas, and downstream from any potable water points.

The distribution of water points and the timing of their use have direct impact on range quality. If possible, pasture areas that are under-utilised because of a lack of watering points

should be identified. New water points could then be established to reduce local overgrazing. Local pastoral groups could assist in this process, which would be of benefit to them as well.

In cases of inadequate supply, the use of traditional and modern water harvesting techniques such as surface catchment basins should be assessed to collect rain water.

Prevention of zoonotic diseases.

Strategies for preventing the transmission of zoonotic diseases from animals to humans should include the following considerations:

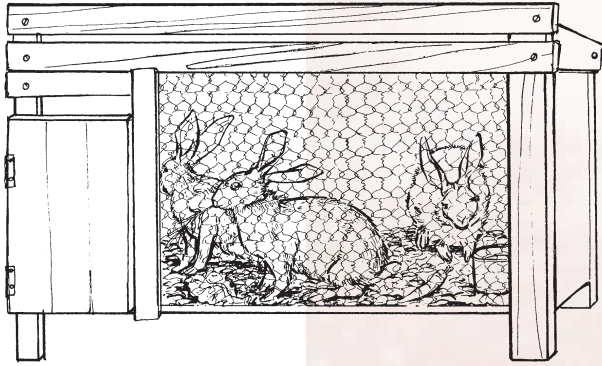
Activity/Incident	Suggested Action(s)
General measures	Regular monitoring and screening of livestock diseases
Extension programmes	Awareness raising on the impacts of zoonoses, food hygiene, cleanliness of plots, and the need for animal vaccinations
Tuberculosis	Screening and testing of animals; removal and safe disposal of tuberculosis positive animals. Extension agents should concentrate on food hygiene, e.g. boiling of milk
Brucellosis	Screening and testing of animals; removal and safe disposal of tuberculosis positive animals; vaccination of calves. Extension agents should concentrate on food hygiene, e.g. boiling of milk
Rabies	Regular vaccination of dogs and cats; control and removal of infected animals – wild and domestic
Tape worms	Regular food inspection

3.6 Housing

Domesticated animals live, by definition, in and around the homesteads of people. Depending on what stock are being kept, they will be sheltered either literally in the house, confined to a pen or stable in the home compound, or herded at some distance from the home. Some breeds are commonly corralled at night time. The benefits, i.e. the reasons for housing and management in this way can vary widely but include aspects such as:

- protection against climatic conditions;
- excreta management – collecting dung for fuel or fertilizer being easier from a confined area;
- disease control;
- prevention of theft or damage by predators;
- saving of labour;
- control of product quality; and
- prevention of damage to crops.

Housing for animals, however, demands an added investment and can be a source of environmental impact both in terms of cutting wood to establish shelters or corrals, as well as tending to focus the impact of livestock movements and grazing patterns in the immediate area. Housing or movement control options – which can help reduce certain environmental impacts – include grazing animals behind fences, tethering cattle which are moved each day, or zero grazing, where animal feed is brought to the animals and where the dung is collected. The choice of whether to house animals or not can be important: for example, the loss of eggs and chicks due to predators and diseases can be decreased and the output of poultry production can be increased by at least



Keeping small animals to sustain the household nutrition status and provide income

20 per cent, if simple construction material is provided for chicken housing.

Shelter from the wind, sun or rain, as well as adequate ventilation, are essential aspects of all animal housing. Overcrowding, too, should be avoided as this can be detrimental to animal health, and therefore eventual production. Depending on the climate, simple solutions for housing should be sought. Instead of cutting bushes to fence in cattle, goats and sheep, refugees should be encouraged to plant “living fences”, e.g. hedges or thorn bushes which will grow and provide forage and shelter. Housing of cattle, sheep and goats in camps should be restricted to limited numbers, and only allowed if sufficient space is available and at least a basic animal health service can be provided. A milk cow needs at least 5m² space, while a sheep or goat would need at least 1m². Four adult chickens can be kept on 1m².

3.7 Carrying Capacity

Carrying capacity, which may be defined as “the number of animals which can be maintained on a given area of land without disturbing the equilibrium of plant growth and livestock production on the range”, is one of the most important considerations when it comes to

successfully managing herds of mid-large sized livestock.

Most rangeland scientists now agree that the impact of extensive grazing as an environmental problem had been greatly overestimated. In the semi-arid regions of Africa, the Near East and Central Asia, pastoral (mobile) livestock production is now seen as an appropriate and sustainable form of land use that is – from an environmental and economic perspective – less risky than cropping.

The size of pastoral herds follows cyclical patterns controlled by the alternation of rainy and dry seasons and by the regular occurrence of droughts. Livestock herds seldom reach the carrying capacity of rangelands between droughts and seldom can enough stock be kept over the dry season to damage wet-season pastures.

The migration and grazing patterns of mobile pastoral herds are based on a strategy of maximum utilisation of rangelands with minimum depletion of the resources. There is a constant feed-back mechanism between the animals of pastoral herds and plants in the following manner:

- during years with average rainfall, there is a relative balance between animals and plants;
- in semi-arid and arid areas, the interaction between grazing animals and vegetation rarely comes to an equilibrium. If pastures are overgrazed, the productivity of the herds declines sharply and either the herd size decreases or the herds have to migrate to other areas. Seeds survive in the soil and, induced by the next rains, will germinate and start to grow again; and
- pasture can be improved through moderate, controlled grazing, combined with the fertilizing effect of animal manure.

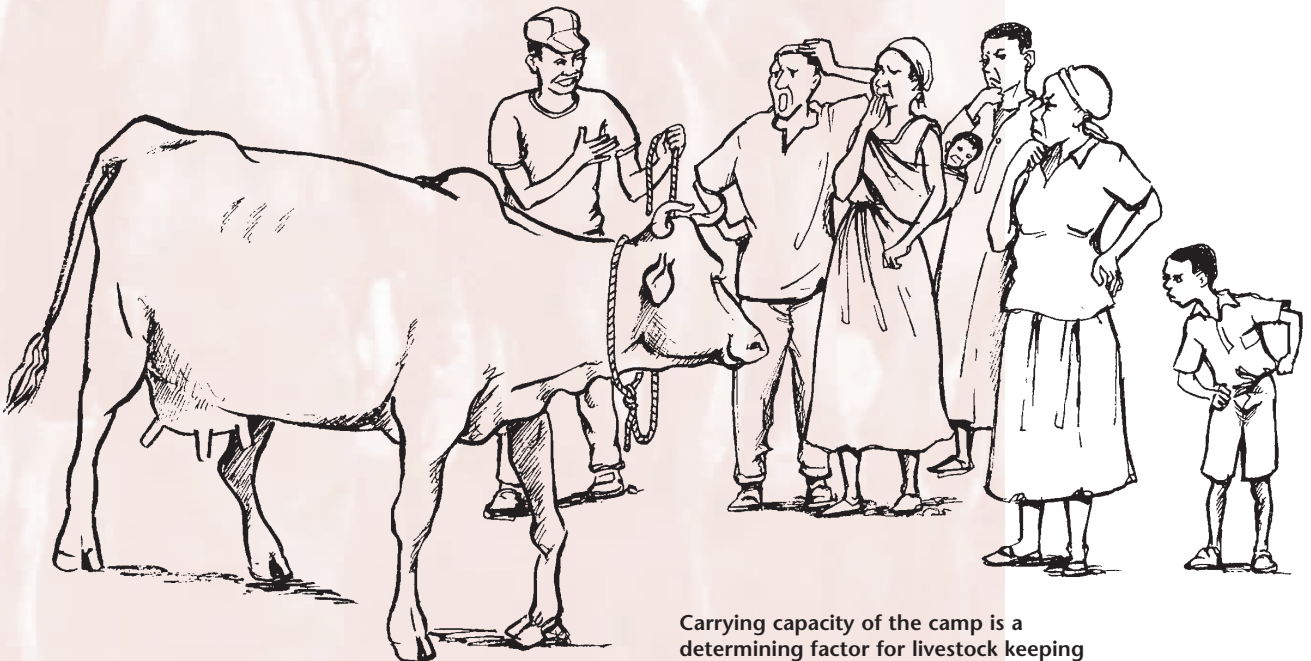
It is important to see that overgrazing as well as undergrazing can result in the growth of woody plants and unpalatable grasses, thus resulting in a reduction of the productive potential of an area. Livestock production represents a system of land management in marginal areas that can maximise food production with minimal input.

Herds, particularly of sheep and goats, recover quickly after droughts, suggesting that there has been little long-term damage to the range. Also, in many parts of Africa, the number of animals has continued to increase over many decades despite claims of overgrazing. Increase in the size of herds would not have been possible, if the pastureland could not support this growth.

The old paradigm of the “tragedy of the commons” has been replaced by the perception that pastoral communities have developed efficient forms of communal rangeland management.

The impact of grazing animals on the herbal layer, and therefore the carrying capacity, depends on various factors such as climate, structure of vegetation and other forms of land use. Sub-humid areas are more susceptible to overgrazing than semi-arid areas. Also, perennial grasses, bushes and trees are much more susceptible to overgrazing than annual grasses. The temporary presence of a high density of livestock will have detrimental effects on vegetation, and inappropriate cropping patterns and uncontrolled fuelwood collection can reinforce the impacts of overgrazing.

Consequently, figures on carrying capacity quoted in the relevant reference literature should be treated with caution. It had been estimated that, in arid areas with 200mm annual rainfall, the maximum stocking rate would be around 7 TLU (Tropical Livestock Units) per km², i.e. 7 head of cattle or 70 goats (or 70 sheep). The maximum stocking rate for semi-arid areas with 600mm annual rainfall would be around 20 TLU per km², i.e. 20 head of cattle or 200 goats (or 200 sheep).



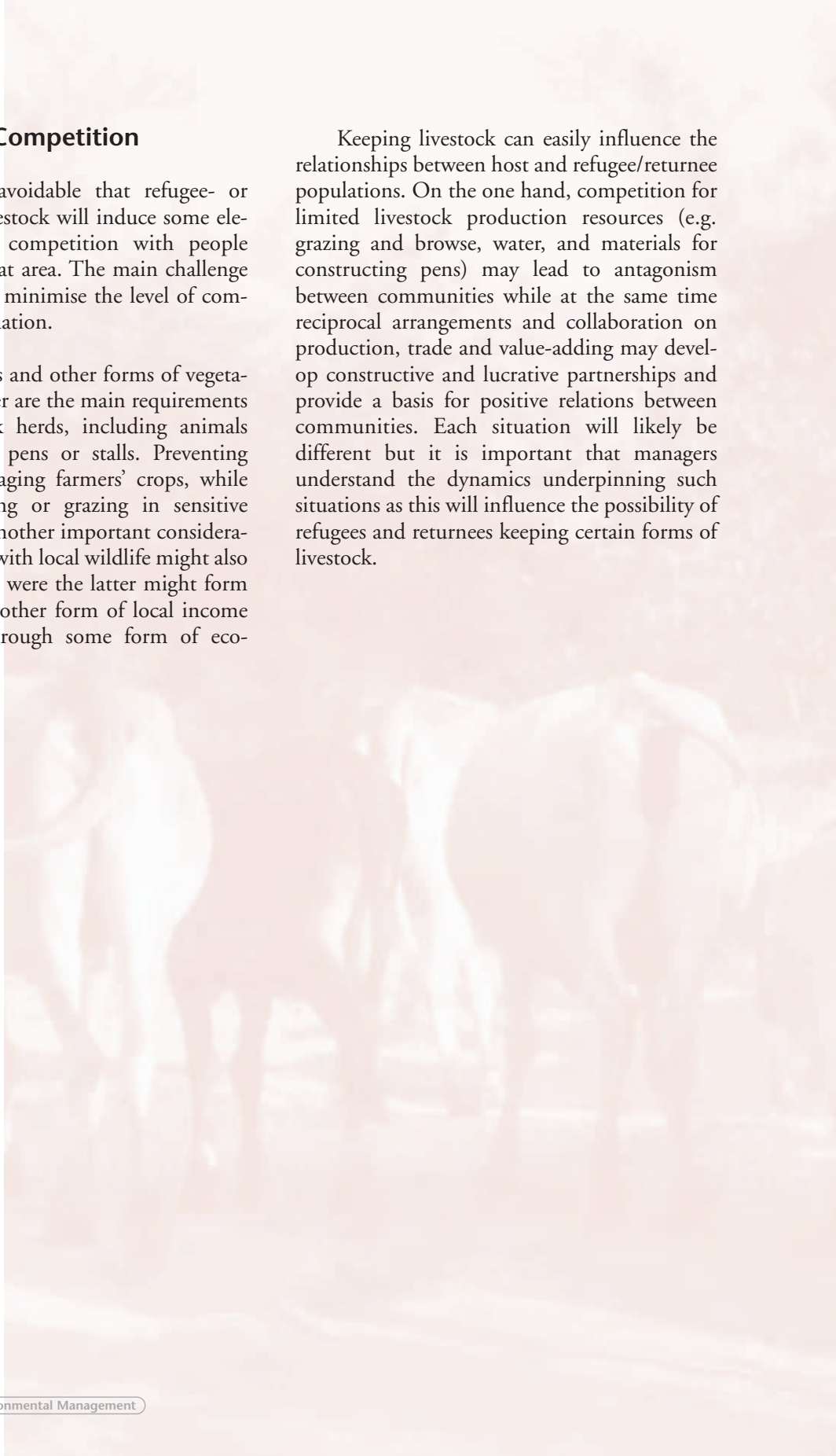
Carrying capacity of the camp is a determining factor for livestock keeping

3.8 Resource Competition

It is probably unavoidable that refugee- or returnee-owned livestock will induce some element of resource competition with people already living in that area. The main challenge is therefore how to minimise the level of competition and degradation.

Grasses, shrubs and other forms of vegetation, as well as water are the main requirements for many livestock herds, including animals being confined to pens or stalls. Preventing animals from damaging farmers' crops, while avoiding overgrazing or grazing in sensitive ecological areas is another important consideration. Competition with local wildlife might also be a limiting factor were the latter might form the basis for some other form of local income generation, e.g. through some form of ecotourism.

Keeping livestock can easily influence the relationships between host and refugee/returnee populations. On the one hand, competition for limited livestock production resources (e.g. grazing and browse, water, and materials for constructing pens) may lead to antagonism between communities while at the same time reciprocal arrangements and collaboration on production, trade and value-adding may develop constructive and lucrative partnerships and provide a basis for positive relations between communities. Each situation will likely be different but it is important that managers understand the dynamics underpinning such situations as this will influence the possibility of refugees and returnees keeping certain forms of livestock.



4

Good Management in Practise – Some Options for Improving Livestock Systems

4.1 Introduction

Situations that force people to leave their homes and become refugees can have a variety of serious impacts on their livestock herds, for example:

- ▶ animals may be slaughtered or sold in high numbers by their owners (before or during forced migration), or stolen by soldiers or by desperate people in need of food;
- ▶ if families are able to take their herds with them when they flee to other regions, fodder might be insufficient or inappropriate. Their animals are likely to mix with other herds at watering points and risk being exposed to local epidemic diseases to which they may have little resistance – while likewise exposing local animals to “imported” diseases; and
- ▶ in case of rapid migration, refugees may have to leave their animals behind (see Figure 1). Some family members may attempt to remain with their animals, but may move to another area where herds may be concentrated at places granting relative security, thus leading to similar ecological problems to those caused by refugees migrating to other countries.

A number of social problems can also arise as a result of the dislocation of pastoral societies. If households which are totally dependent on livestock production lose their animals, they become vulnerable. Conflicts between the population in the host country and refugees can arise from competition for grazing areas and water points, and from destruction of fields caused by movements of big herds.

The environmental and social risks associated with refugee- or returnee-owned livestock should be counterbalanced by the positive effects regarding food security, income generation, provision of transport and fuel, fertilization of gardens and small fields, and the preparedness for durable solutions. If refugees belonging to pastoral groups are expected to have a sustainable livelihood after repatriation, they will need animals – of a suitable type and breed, to suit the peoples’ needs and the local conditions. Possible interventions are outlined in Table 6 and discussed further below.

4.2 Livestock Production Systems

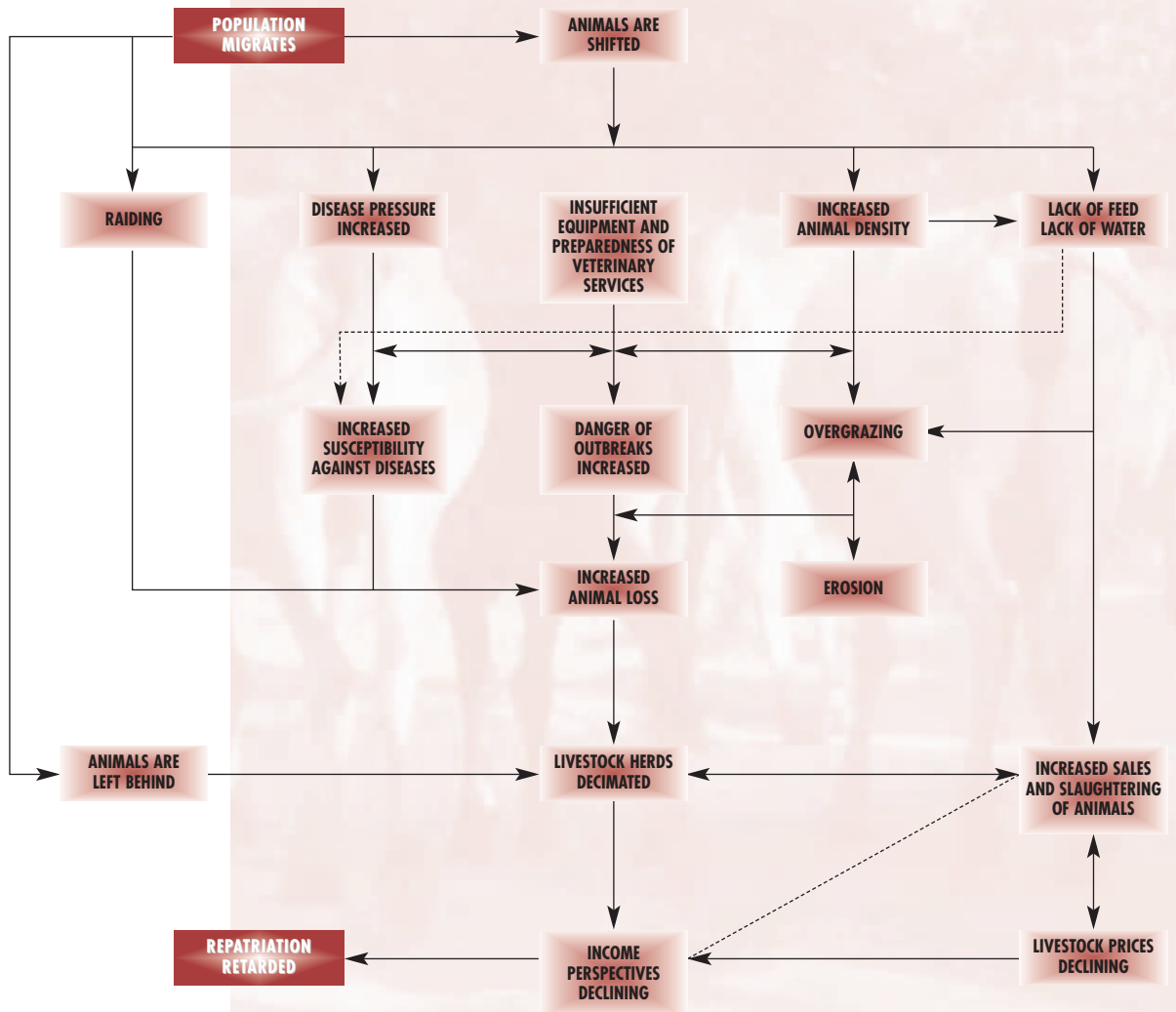
Livestock production systems vary enormously, even for the same type of animal. Variations in these systems will depend on factors such as the local climate, the prevailing environmental conditions, water availability, land-use patterns, disease risks for that area, available capital, security and the risk of predation, the availability of fodder, the animal breeds available, management skills, household needs, and more. Despite this complication, a few general systems can be identified within the current context, as described below.

- ▶ **Scavenging and free-ranging animals** reflect low levels of management where livestock contribute, but are incidental, to a family’s subsistence or economy. This infers that small numbers of animals – frequently poultry, pigs, sheep and goats – are released

around the homestead and neighbouring area to fend for themselves. These animals must commonly find their own food and water and there is a high exposure to predation, theft and disease. Health-care, disease and parasite control is infrequent, production costs are low, and production is poor. Other productive resources and activities, such as kitchen gardens and tree seedlings, can be damaged by animals kept under such methods.

➤ **Extensive management** involves the movement of a large number of animals into larger areas of land for grazing and browsing. This practice commonly involves herding, watering and treating the animals to prevent or control diseases, and is commonly associated with keeping camels, cattle, goats and sheep. More effort is invested in this form of management as animals are supervised or herded for all or part of the time. Similarly, investment in inputs is likely to be higher

Figure 1. Scenario/Impacts of Refugee Movements on Livestock Production Systems



with more knowledge required of the health and behaviour of the livestock, and more inputs being provided if finances allow, e.g. acaricides to control external parasites, vaccines, or antibiotics. Breeding is not usually well controlled, both in terms of season and the selection of breeding animals.

- **Intensive management** systems require greater inputs, more management skills and a more scientific approach to production. Breeding, feeding and health issues are considered and water availability and quality is controlled. There are likely to be controls over the environment under which the animals are kept, e.g. purpose built housing.

Feeds may even be purpose grown and animals grazed *in situ* or fodder brought back to housed animals. Economic risks are higher, reflecting higher value, more productive strains or breeds. Feeding costs, veterinary costs and management costs are also likely to be high, but the returns in terms of yield/production and value are also substantially higher. Intensive systems can be adopted for producing cattle, goats, pigs, poultry and rabbits.

- **Integrated management** combines intensive/semi-intensive livestock production systems with other productive activities such as crop production, or links a number of

Table 6. Possible Interventions that Support Good Livestock Management

	<i>Provision of Technical Inputs</i>	<i>Management and Training</i>	<i>Interventions in Social Systems</i>
Grazing Systems		<ul style="list-style-type: none"> ● Flexible stocking ● Securing mobility of herds 	<ul style="list-style-type: none"> ● Use of local knowledge ● Grazing and herding contracts
Feeding	<ul style="list-style-type: none"> ● Supplementation (fodder, concentrates, by-products) ● Treatment of straw ● Urea-Molasses-Blocks ● Pasture improvement 	<ul style="list-style-type: none"> ● Integration of crop and livestock production ● Silvo-pastoralism 	
Animal Health	<ul style="list-style-type: none"> ● Vaccinations ● Prophylactic treatment (acaricides, deworming) 	<ul style="list-style-type: none"> ● Disease control strategies ● Community animal health care 	<ul style="list-style-type: none"> ● Traditional treatment
Public Health	<ul style="list-style-type: none"> ● Screening of zoonotic diseases ● Vaccination of animals (e.g., brucellosis, rabies) ● Construction of small abattoirs 	<ul style="list-style-type: none"> ● Careful management of veterinary drugs ● Training and extension ● Food inspection 	
Drinking Water	<ul style="list-style-type: none"> ● Construction of separate water points for human consumption and animals 	<ul style="list-style-type: none"> ● Water harvesting 	
Income Generation	<ul style="list-style-type: none"> ● Restocking ● Housing of animals 	<ul style="list-style-type: none"> ● Breeding programmes 	
General		<ul style="list-style-type: none"> ● Consideration of laws and regulations 	<ul style="list-style-type: none"> ● Consideration of traditional rules (e.g., grazing, watering rights)

Table 7. Some Implications of Different Animal Production Systems

System	<i>Scavenging and free-ranging</i>	<i>Extensive management</i>	<i>Intensive management</i>	<i>Integrated management</i>
Knowledge and skills required	Basic skills	Modest skills needed	High need for relevant skills and knowledge in a limited number of areas (e.g. animal health, feeds and feeding)	High level of skills and knowledge in a number of areas of animal production, e.g. agriculture
Land and natural resources required	Limited requirements for resources as animals rely on waste materials and available vegetation	High reliance on local natural resources such as grasslands and shrubs, with an associated need to cover relatively large areas	Usually requires supplements and high quality feeds (grown locally or brought in) plus a need for animal health products due to increased exposure to parasites	High reliance on local resources, using, adapting and recycling what is available. High commitment to health and general management through biological systems
Productivity and impact on livelihoods	Low productivity	Modest productivity, but vulnerable to seasonal variations	High productivity, but also high costs and risks	High productivity possible; can also be highly sustainable
Effort	Negligible	Possibly high in terms of labour	High sustained labour and skill needed, with some effort being offset by the use of external inputs	High effort during establishment. Stable production possible for minimal sustained effort, once established
External inputs and costs incurred	None	Minimal	Heavy and continuing reliance on external inputs, making this a high cost option vulnerable to fluctuations in the availability and price of resources	Low reliance on external inputs
Implications for the environment	High risks in terms of human and environmental health, with animals transmitting disease and parasites	High risks of degradation in local area from trampling and/or overgrazing, leading to habitat destruction, soil erosion, and pollution of water resources	High risk of pollution and contamination from concentrations of droppings, and disposal of veterinary products	Low risk systems that minimise impacts on the environment and enhance animal production. Animal welfare and environmental considerations are usually high priorities

different livestock-keeping activities with one another. Integrated management approaches reduce costs – when compared with intensive systems – by producing or supplementing animal feeds, controlling pests and disease, with reduced reliance on external resources, while aiming for high production.

To help determine which broad type of production system might best suit a particular situation, an analysis of the relative advantages and disadvantages of these various production systems is shown in Table 7.

In addition to the animals themselves, livestock production requires a range of inputs, including equipment for handling and treating animals, medicines (both traditional and proprietary), and equipment for storing or handling products – milk containers and hygienic containers for transporting meat. In turn, medicines must be kept in secure hygienic containers to reduce extremes of temperature and contamination. Veterinary equipment similarly requires cleaning and sterilising, and storage in clean, secure containers.

Provision of these items need not be expensive, but there are likely to be costs and logistical issues involved in ensuring that they are available. Their safe and efficient use is essential if they are to serve their purpose for the period for which they were designed. Loss or damage of such items, and the capacity of users to replace them may impact animal health and welfare, and the economy and health of livestock owners.

4.3 Grazing Strategies that Match the Carrying Capacity

Well considered and respected grazing strategies are one of the key elements of successful livestock management in any situation, but of

particular importance in the refugee and returnee contexts where different communities are essentially vying for what are often scarce natural resources. Discussions with local community leaders in particular should reveal a number of options in relation to where and when animals might be grazed, which should help with decision making and monitoring. Key considerations (see also Table 7) to bear in mind are the following:

Mobility of herds. The effects of local overgrazing can be mitigated if pastoral groups are permitted to move their herds. Whether this is a feasible option or not depends on a range of factors, including the prevailing environmental conditions, population density, local tenure rights, land-use patterns and the granting of permission by the local and national host government authorities.

Flexible stocking. Rotational grazing and the introduction of mixed livestock herds are appropriate options for savannah management in semi-arid areas. The four important ruminant species raised in pastoral herds – cattle, sheep, goats and camels – have different grazing patterns. Cattle, including yaks and buffalo, and sheep are grazers and mainly feed from ground level vegetation. Camels and goats are browsers, are more selective feeders and prefer vegetation from shrubs, bushes and trees. Thus, as a consequence of their different grazing patterns, mixed livestock herds have potential for a higher productivity per hectare of a given area. For example, the carrying capacity of rangelands is higher when a herd is mixed of sheep and goats than when consisting of one of these species alone.

Local knowledge. Traditional systems used by local pastoral groups to evaluate the carrying capacity of rangelands are based on subjective monitoring of environmental indicators such as plant composition, quantity and quality of forage, degradation of the rangeland,



Large herds of cattle should be grazed away from the camp in authorised areas

and the behaviour of wildlife. Interventions such as the development of grazing strategies, pasture improvement, or water harvesting projects should draw on this local knowledge.

Grazing contracts. If the vegetation cover allows for a temporary increase of animal numbers, the local population and local authorities have to be consulted on the proposed use of the rangeland. Grazing contracts may then have to be negotiated – either directly by concerned refugees or sometimes through an intermediary – frequently an implementing partner acting on behalf of refugees. On such occasions, it may be helpful to offer the local community something in exchange for the granting of grazing rights to refugee livestock, for example, help in the installation of new watering points.

Herding contracts. Refugee animals can be temporarily combined with local herds on

the basis of herding contracts. In exchange for the herding service, local herders may receive payment in kind, e.g. the right to use the milk or a certain share of the off-take of the herd for their own purposes. This strategy – which can also provide employment for refugees as herders – has the advantage that refugees can get their herds back when being repatriated. It is an option, however, which is likely to work only in those situations where the local population and the refugees consist of the same or affiliated ethnic group.

An additional strategy worth considering – perhaps in association with a more integrated mixed farming system or practice (see Section 4.4) – is to respect and encourage the use of fallow. Fallow resembles a form of shifting cultivation where the location of crops (including grasses) is changed every couple of years, but where land is also set aside to recover from

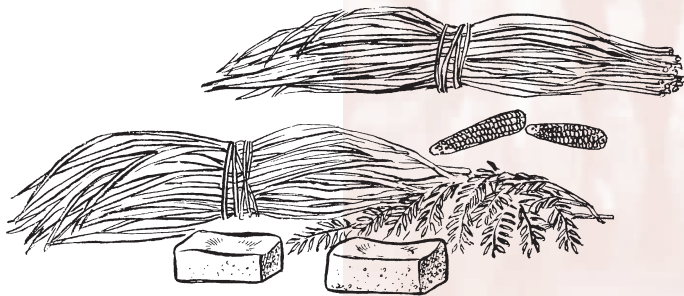
Table 8. Mitigation of Negative Environmental Impacts of Refugee Livestock during Emergencies and the Care and Maintenance Phase

	<i>Emergency Phase</i>	<i>Care and Maintenance Phase</i>
Deterioration of plant cover/ overgrazing	<ul style="list-style-type: none"> ● grazing and herding contracts ● use of local knowledge ● sale of animals ● designation of grazing areas 	<ul style="list-style-type: none"> ● flexible/rotational grazing ● pasture improvement ● provision of feeding (supplementary feeding, straw, hay, by-products) ● fodder banks
Destruction of fields	<ul style="list-style-type: none"> ● contracts/negotiations with local population 	
Cutting of bushes and trees	<ul style="list-style-type: none"> ● designation of grazing areas 	<ul style="list-style-type: none"> ● live fencing
Destruction of seedlings	<ul style="list-style-type: none"> ● fencing ● designation of grazing areas 	<ul style="list-style-type: none"> ● designation of grazing areas
Reduction of biodiversity	<ul style="list-style-type: none"> ● designation of grazing areas 	<ul style="list-style-type: none"> ● designation of grazing areas
Depletion of water resources	<ul style="list-style-type: none"> ● designation of grazing areas ● limitation of animal numbers 	<ul style="list-style-type: none"> ● provision of water sources in distant grazing areas ● construction of bore holes and wells ● water harvesting
Overfishing	<ul style="list-style-type: none"> ● food aid 	<ul style="list-style-type: none"> ● fishing contracts
Disruption of traditional livestock production patterns	<ul style="list-style-type: none"> ● designation of grazing areas 	<ul style="list-style-type: none"> ● designation of grazing areas
Competition for rangelands	<ul style="list-style-type: none"> ● contracts/negotiations with local population ● designation of grazing areas 	<ul style="list-style-type: none"> ● contracts/negotiations with local population ● designation of grazing areas
Water pollution	<ul style="list-style-type: none"> ● separation of water points for humans and animals 	
Air pollution	<ul style="list-style-type: none"> ● limitation of animal husbandry in settlements 	
Slaughtering wastes		<ul style="list-style-type: none"> ● construction of small abattoirs and dumping sites
Health hazards caused by uncontrolled use of veterinary drugs	<ul style="list-style-type: none"> ● employment of local veterinary personnel 	<ul style="list-style-type: none"> ● training and extension
Transmission of diseases from animals to humans	<ul style="list-style-type: none"> ● limitation of animal husbandry in settlements 	<ul style="list-style-type: none"> ● training and extension ● screening/testing of animals ● vaccination ● improved veterinary diagnosis
Increased disease prevalence of livestock diseases	<ul style="list-style-type: none"> ● control of animal movement ● designation of holding grounds ● emergency vaccination campaigns 	<ul style="list-style-type: none"> ● training and extension ● community animal health care ● improvement of animal health services ● vaccination, prophylactic treatment

growing crops. Many traditional fallow systems are of 10 years' duration, but increasingly fallow periods have become shorter and have even disappeared in many regions due to increased competition for land. In terms of livestock management, it is important that **fallow** areas are respected and either zero grazing takes place, or a selective light browsing might be allowed, the added benefit of this being the irregular addition of animal manure to the soil. Some fallow areas may also be deliberately planted with crops such as grass or legumes in a bid to regenerate the soil more quickly. Grasses or legumes from such schemes are then used as animal fodder.

4.4 Supplementary Feeding and Pasture Improvement

In the emergency phase of refugee situations, provision of livestock feed is likely to be limited because of the need to ensure adequate protection nutrition, shelter, water and health care for people. In the care and maintenance phase, however, supplementary feeding could be implemented – either in isolation or in connection with a micro-credit programme or loan for other agricultural inputs such as seeds or tools. Depending on the economic situation of the refugees, free provision of animal feed might be



Animal feeds for zero grazing

a first step in a programme to support self-reliance.

Provision of fodder. Providing fodder for refugee livestock can relieve pressure on the surrounding rangeland and can reduce competition for natural resources with local livestock producers. Animals fed with supplements will be satisfied with lower quality rangeland, thereby preventing the most palatable species from being overgrazed. The supply of feed, however, is very costly and is only feasible if materials are locally available. Care must be taken to ensure that any fodder that is collected for such a purpose is not having a negative environmental or social impact at the place(s) where it is being gathered.

By-products from agricultural production. In many tropical countries, the main constituents of livestock feed or suitable substitutes are usually available. These include the basic energy components such as grains, tubers and molasses; protein surrogates such as pulses, oil cakes, fish or meat meal; and fibrous components such as cereals or sugar cane by-products. Mineral supplements can be produced from bone meal. A broad range of wastes from agricultural production has been identified as being suitable for animal nutrition. These include coffee or cocoa pulp, groundnut shells, bananas, pineapple pulp, rice husks, cassava leaves and many others. By-products from livestock and fish industries (slaughterhouse wastes, sterilised poultry litter, fish and shrimp wastes) can be used to feed ruminants. A comprehensive investigation of the local availability of agricultural residues and by-products is advised to assess the potential for improving animal feeding under emergency, as well as during care and maintenance, situations.

Straw, hay and silage. Green fodder – fresh cut grass, hay or silage – and straw are valuable animal feeds, but bear high transport costs and often require storage space and shelter.

While fresh or dried grasses require little supplementing, the nutritional value of straw for ruminants is low and normally not adequate to meet an animal's energy requirements. The value of straw for ruminant nutrition can, however, be upgraded through physical and chemical treatment (see Box 6). Physical treatment includes cutting, chopping and grinding. Simple chaff-cutting machines can be fabricated by local blacksmiths. Chemical treatment based on urea, ammonium or sodium-hydroxide can increase an animal's digestibility of straw and resulting energy intake by up to 100 per cent.

Integrated crop, tree and livestock production. Nutrient recycling is an essential component of any farming system. Animals can be herded on harvested fields to use crop residues such as cereal straws, dried stalks of maize and sorghum, and groundnut tops. The cultivation of fodder trees has various beneficial effects on the environment. Legumes are a good source of protein and they contribute to the enrichment of soils through nitrogen fixation. Thorn bushes can be planted as living fences for enclosures, but in time will also produce fodder, shelter and a possible source of fuelwood and building materials.

Urea-Molasses-Mineral-Blocks. In countries with sugar processing industries, the production of urea-molasses mineral blocks (UMMB) could be considered as a feeding supplement. These blocks provide energy and protein for animals grazing on poor pasture, while the production and sale of UMMB blocks can also enhance income generation among the local population. The cost of UMMB production depends largely on the availability of the constituents, and on labour costs. The production costs of UMMB in Africa can be estimated at US\$100–150 per tonne. This figure excludes the equipment required for blending which consists of cement mixers, moulds (which could be fabricated locally), and shovels. Further costs arise for transport of the blocks. An example for the composition of UMMB is given in Table 9.

Box 6

Treatment Of Straw

A wide range of straw feeding methods exists, ranging from selective consumption, chopping and soaking of straw, breeding or management for better or more straw, or the use of adjusted cropping patterns and types of animals. A range of treatment methods is available to increase digestibility and/or intake of straw. Simple methods include chopping or soaking of straw – more complicated ones involve steam treatment.

The most practical approach is based on the use of urea. Urea can be sprayed over the straw in a ratio of 2 per cent with a 1:1 water:straw ratio, a form of catalytic supplementation. More relevant is the treatment of straw with urea where 4kg of urea are spread with 50–100l of water on 100kg of straw. The mix is kept in a heap for one to three weeks after which it can be used as feed with or without concentrate supplements. The treatment process increases the availability of energy from the fibres in the straw, apart from providing nitrogen for better rumen function. Experience suggests that the technology is most likely to work in the following situations:

- when plenty of dry straw is available, free from fungal contamination;
- when farmers have slender straws from rice, wheat and barley rather than coarse straws from maize, sorghum or millets;
- when straw is cheap compared to other feeds and where there is a shortage of grasses or other green feed;
- when water is freely and conveniently available;
- when the price of urea is not prohibitive and where the cost of polythene covering materials is low;
- when labour availability is good, though small stacks do not require such high labour inputs at one time as the large stacks;
- when the animals are medium producers (milk or meat); and
- when produce such as milk can be sold at a remunerative price.

Based on FAO, 1988; Singh and Schiere, 1995.

Table 9. Composition of Molasses-Urea Mineral Blocks

Constituents	Composition (%)
Molasses	40
Wheat bran	36
Urea	8
Cement	9
Salt	5
Feed lime (CaCO ₃)	1.5
Monocalcium phosphate	0.5
Copper sulfate	0.1
Zinc sulfate	0.1

Source: FAO Technical Cooperation Programme with Swaziland, TCP/SWA/2251

Pasture improvement. In cases of severe degradation, oversowing of rangeland can be employed for emergency relief. This option is of special consideration in countries, where seed producing plants exist, but could also encompass the introduction of exotic species of perennial grasses and legumes. Improvement of rangeland in emergency situations is only possible if sufficient rainfall supports this operation. If large areas are considered, oversowing must be carried out by airplane.

The introduction of legumes into existing grassland and fallow areas can provide a low-cost stimulus for improvement of livestock production in degraded areas. A range of legume species can be established simply by broadcasting on the surface of the soil without cultivation and fertilizer and without the need for subsequent grazing management. Some of these species are adapted to heavy grazing, and will spread rapidly. However, experience in the introduction of these legumes in the respective country should be evaluated to estimate returns.

Animal manure is generally an excellent additive to the soil, helping it maintain structure and replenishing essential nutrients

which are constantly being removed by vegetation. Dung and urine contain several nutrients such as nitrogen (essential for growth), phosphorous (needed for the plants to flower, bear fruit and develop strong root systems) and potassium (important for tuber and fruit enlargement, as well as helping maintain healthy plant tissues).

The amount and quality of urine and dung produced depends on the type of animal, its size and the type of feed, as well as the way the animal(s) is managed by the farmer. According to Defoer et al. (2000), one way to calculate the amount of manure produced is on the following basis:

- ▶ one animal of 250kg live weight has a feed intake that averages 2.5 per cent dry matter of its live weight. It therefore consumes $250 \times 365 \times 0.025 = 2,280$ kg of dry matter. With an average digestibility of 55 per cent, the animal will produce $0.45 \times 2,280 = 1,026$ kg of dung every year;
- ▶ small ruminants weighing 25kg and feeding 3.2 per cent daily on average of their live weight, consume $25 \times 365 \times 0.032 = 292$ kg dry matter. If their average digestibility of the feed is estimated at 60 per cent it can be calculated that one small ruminant produces some 117kg of dry matter faeces per annum.

The nutrient content of manure and other organic fertilizers varies according to the quality of feed and the way it is stored and handled. Table 10 gives an indication of the concentration of the main nutrients in the manure of cattle and small ruminants and other sources of organic fertilizer. Dry matter content of manure also varies widely: in cows on lush pasture it can be less than 15 per cent but in sheep on dry forage it can be higher than 50 per cent.

Table 10. Nutrient Content of Manure and other Organic Fertilizers (percentage)

<i>Organic fertilizer</i>	<i>Nitrogen (N)</i>	<i>Phosphorous (P)</i>	<i>Potassium (K)</i>	<i>Dry matter</i>
Cattle				
Fresh manure	1.4–2.8	0.5–1.01	0.5–0.6	15–25
Kraal (litter)	0.5–2.3	0.22–0.81	0.77–5.44	40–60
Kraal (no litter)	1.5–2.5	0.2–0.6	1.5–2.0	30–50
Goats and sheep				
Fresh manure	2.2–3.7	0.25–1.87	0.88–1.25	50–70
Other				
Fresh green manure	2.0–4.3	0.1–0.3	1.0–3.4	
Compost	0.3–0.9	0.07–0.17	0.14–1.3	
Household waste	0.2–0.9	0.05–0.5	0.1–2.1	
Ash from cooking	0.2–0.6	0.1–0.6	1.1–2.7	

Source: Based on a compilation by Defoer et al (2000).

4.5 Mixed Livestock-Crop Systems

4.5.1 What Is Mixed Farming?

Many farmers in tropical and temperate countries survive by managing a mix of different crops and/or animals. A simple form of mixed farming is when crop residues are used to feed the animals and the excreta from the animals are then used as nutrients for the crops. Other forms take place where grazing under fruit-trees keeps the grass short, or where manure from pigs is used as a nutrient additive for fish ponds.

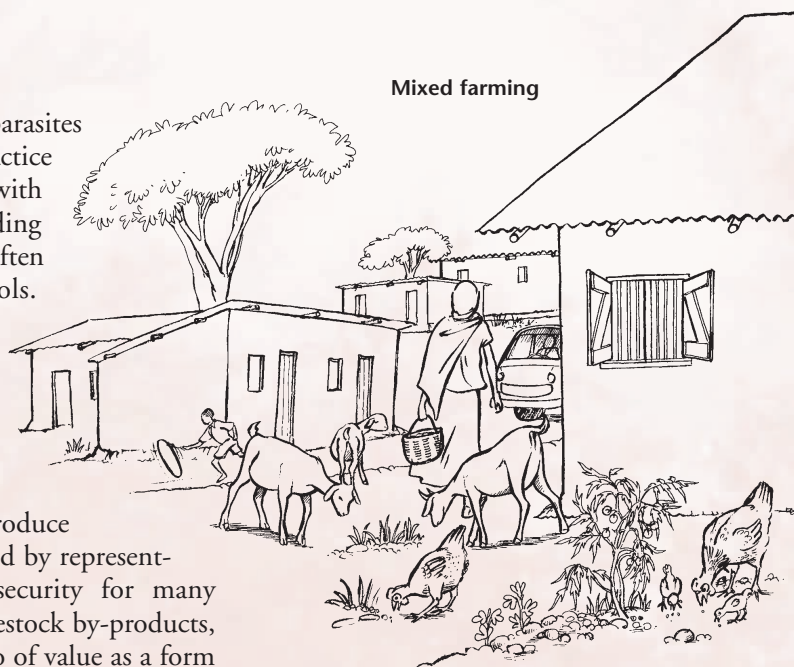
Traditionally, a wide variety of mixed farming systems has been used worldwide. The essence of many modern organic farming systems, including permaculture, lies in the mixing of crops and animals. These systems are essential for the livelihood of farmers and for the production of food and other commodities for the cities and export markets. Even many highly specialised crop and livestock systems in developed and developing countries are rediscovering the advantages of mixed farming.

Many forms of mixed farming exists can be identified, depending on factors such as weather

patterns, market prices, political stability, technological developments, local soil characteristics, the composition of a family or community, and a farmer’s ingenuity. At one level, pastoralists can be said to practise a form of mixed farming since their livelihood depends on the management of different feed resources and animal species, while at the other extreme, different farmers might work together each with their own specialisation, for example, producing vegetables for human consumption, growing fodder materials for livestock, providing livestock manure for crops, and so on, all co-ordinated in a farm-based mixed system. Other forms of mixed farming include the cultivation of different crops on the same field, such as millet and cowpea or millet and sorghum, or even several varieties of the same crop with different life cycles – using space more efficiently and spreading risks more uniformly.

Mixed livestock-crop systems need not be complicated and have many potential applications in a refugee or returnee context as the integration of cropping and livestock is a system which optimises the use of resources. Small-scale poultry keeping, e.g. ducks, can help keep

down many water-related parasites and crop pests, a simple practice that goes hand in hand with vegetable production, avoiding the need for costly and often damaging chemical controls. Such simple practices can therefore help sustain livelihoods through growing fresh crops and keeping small livestock, by providing income for households from the sale of produce (e.g. eggs and vegetables) and by representing a form of financial security for many displaced persons. Many livestock by-products, for example manure, are also of value as a form of fertilizer as well as fuel for cooking.



4.5.2 Benefits of Mixed Farming

The integration of crops and livestock-keeping is widely considered as a positive step towards sustainable agricultural production, mainly on account of the associated intensified organic matter and nutrient cycling. Residues from different crops can represent a major on-farm source of organic matter and nutrients. This combines well with the presence of livestock since animals play a vital role as capital assets for security and as a means of saving, for cash income and in nutrient flows. Management of crop residues is therefore often closely related to their use in animal feeding. Competition for certain residues – for example corn stalks – can arise during certain phases of refugee operations if fuel is scarce.

4.6 Identification of Suitable Breeds

Animals serve numerous functions, from providing products such as meat, milk, eggs, wool and hides to acting as a form of savings. In most refugee-related situations, most attention

tends to be given to cattle, camels, sheep, goats, pigs, donkeys and poultry, but others such as buffalo, horses, guinea fowl, ducks, bees, rabbits and pigeons can also adapt to many conditions. Often these “less conventional” animal species consist of small animals that have the advantage of fast reproduction, i.e. a herd or flock of these species is quickly replaced after a calamity such as drought, a flood or disease outbreak. Keeping such species therefore often represents an important livelihood strategy for many households. Cattle are often one of the first species to succumb to drought. After such an event, the restoration of herds commonly starts with the small ruminants, because their reproductive cycle is short and their numbers can increase rapidly. Goats and/or sheep are then sold to re-obtain cattle from elsewhere.

More detailed coverage is given to specific types of livestock in Annex I, but a few additional considerations are worth highlighting in the present context as options for improving livestock systems.

4.6.1 Dairy Animals

Milk is an important product from many animals commonly kept in refugee and returnee situations, but not the only one. Often, however, the quality of available foodstuff does not allow high production levels, although the most commonly kept species can consume coarse feeds like straws, grasses and tree leaves. Goats and sheep have different grazing behaviour than cattle and buffaloes, and a mix of these animals can serve to use the variation of feed on and around the farm better. Cattle and buffaloes also come in a variety of sizes and with different characteristics. Important factors to bear in mind are that it is the bodyweight, orientation to milk production and tolerance to diseases that determines a particular species' suitability to a particular situation.

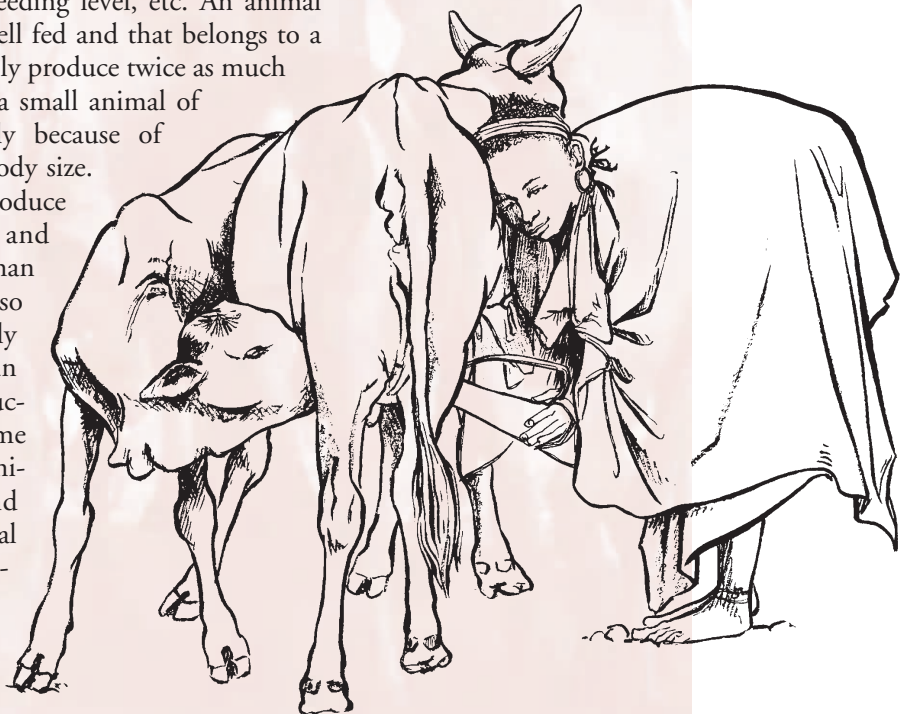
Different levels of milk production are given in Table 11. These levels are determined by body size, genetic background, farm management, health, feeding level, etc. An animal of 600kg that is well fed and that belongs to a large breed can easily produce twice as much milk and meat as a small animal of 200–300kg, simply because of the difference in body size. Goats and sheep produce much less milk and meat per animal than cattle but they also eat less so, roughly speaking, one can say that the production per kilogramme of feed is quite similar for small and large animals. Local tradition also determines the choice for a particular dairy breed based on the

Table 11. Milk production of tropical and commercial goats and tropical and western cows

<i>Animal type</i>	<i>Litres/day</i>	<i>Number of days of lactation</i>
Small tropical goats	0.5–1	50–100
Commercial goats	2–4	50–150
Small tropical cows	2–7	100–200
Large western cows	15–30	300–350

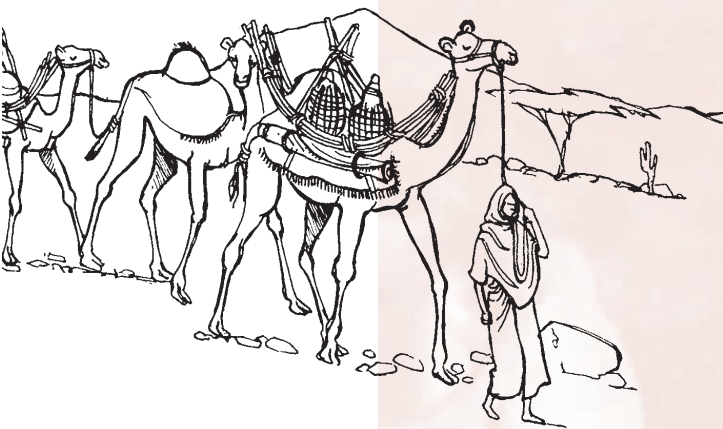
shape of the horns, the colour of the skin, the fat content of the milk (higher in buffaloes than in cows), the colour of the butterfat (from dark yellow to pure white), etc. Some types of milk are even believed to have special medicinal value, e.g. goat milk is generally thought to be good for asthma patients, and the finer distribution of the fat in goat milk makes it easier to digest.

Cow producing milk for the family



4.6.2 Animals for Draught and Transport

A wide variety of work animals exists, including cattle, buffaloes, donkeys, mules, horses, camels and elephants. They provide the means by which millions of families worldwide make a living, but there are also other reasons for keeping draught animals. They can, for example, intensify agricultural production, provide a cheap form of transportation, help in water lifting for irrigation, as well as with milling grains and pulses.



Nomads with camels used for transport, source of food and sometimes cultivation

4.6.3 Goats and Sheep

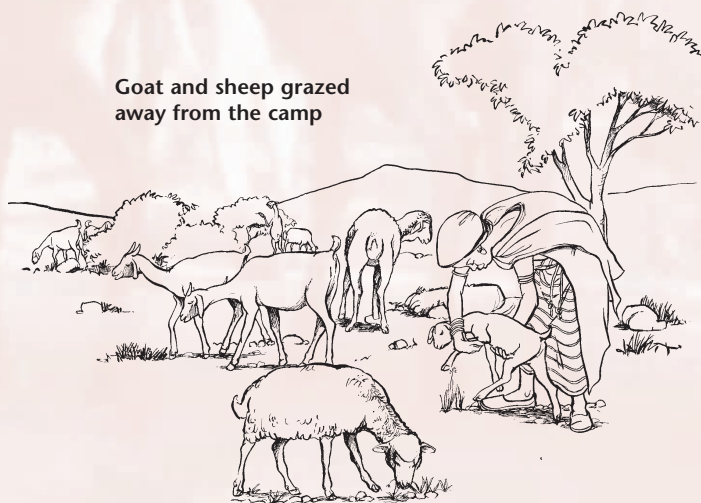
The largest concentrations of goats and sheep are found in Africa and on the Indian subcontinent but every continent has its own species and subspecies. Some are more suitable for meat, others for milk production, but goats and sheep in mixed systems are multipurpose animals. They produce meat, milk, offspring, skin and hair; they serve as a savings account and they provide readily available money when needed.

One of the main concerns with keeping goats in particular is their reputation of causing

soil degradation and erosion. In reality, however, it is not their feeding behaviour *per se* that is necessarily damaging, but the fact that they are commonly left to graze untended and often in sizeable numbers. Goats are browsers and prefer woody species and they normally find sufficient feed in 4–5 hours grazing time, unlike cattle which need double this time to satisfy their feeding needs. They are not selective eaters and are able to convert low-quality feeds, including household wastes, paper and cardboard boxes. Related to their body size, they produce much more milk than cows, and they have a higher reproduction rate than cows and than many breeds of sheep. Goat's milk is an important protein source for human nutrition and can be sold fresh or soured in refugee camps or at local markets. In many countries the meat of goats is highly valued.

Their small size and relatively low individual values bring goats and sheep within the capacity of low-income farmers, as well as many refugees and returnees. In many camps and settlements it is not uncommon for women and young adults to own goats, whereas cattle are almost exclusively owned by men.

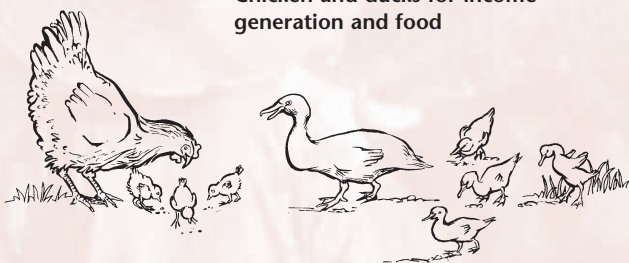
Goat and sheep grazed away from the camp



4.6.4 Poultry

The term “poultry” refers to birds, a class of animals that produce eggs, meat, dung and feathers. It includes a variety of species such as ducks, geese, chickens, song birds, fighting cocks and turkeys. Poultry often provide a living for an individual or family by scavenging or by grazing on harvested rice fields. Among the particular benefits of these animals in a refugee or returnee setting is that they are small, they reproduce easily, they do not need large investments and they thrive on kitchen waste, broken grains, worms, snails or insects. A flock of scavenging birds uses almost no inputs and it can still make a positive contribution to household welfare.

Chicken and ducks for income generation and food



A limited number of chickens can be raised nearly anywhere. If competition is low, they can pick up their food from the ground. Additionally, they can be fed with agricultural by-products such as grain husks and bran. The sale of eggs and birds for slaughter can be a viable option for income generation, particularly for durable situations. Improved breeds of chicken, and other birds such as ducks, geese, and guinea fowls can be introduced, if appropriate feeds are available.

In an effort to encourage self-sufficiency (particularly during the care and maintenance phase) small poultry farms can be established on a co-operative basis, e.g. a small group of women would share responsibility for the birds.

A necessary pre-condition for such projects is that simple housing materials and a parent stock of about 20 to 50 females and one or two cocks are provided. All animals must be vaccinated against Newcastle disease. The need for vaccination against other poultry diseases (e.g. gumboro, fowl pox, Marek’s disease) depends on the prevalence of these diseases in the area, which can be assessed by local veterinarians.

Small poultry farms are only viable if the feeding of the birds can be secured. For low-performing birds, feeds can be mixed from agricultural residues and by-products. Feeds have to contain at least one energy component (grains or residues from milling) and one protein component (e.g. oil seeds or fish meal).

4.6.5 Freshwater Fish

Integration of aquaculture with a farming system provides a means to increase the output of agriculture and to increase efficiency of resource utilisation. In South-east Asia, the combination of fish raising in paddy rice fields or fish ponds in connection with ducks, chicken, pigs and goats is a well developed and adapted technology. The fish are able to feed directly on the manure and the feed residues or on micro-organisms. The animals can either be raised in cages directly on the ponds, or their manure can be transferred into the ponds, together with kitchen garbage and weeds from vegetable gardens. Fish can also be integrated into irrigation schemes, so that fields are fertilized directly or indirectly through feed residues and the manure of the fish.

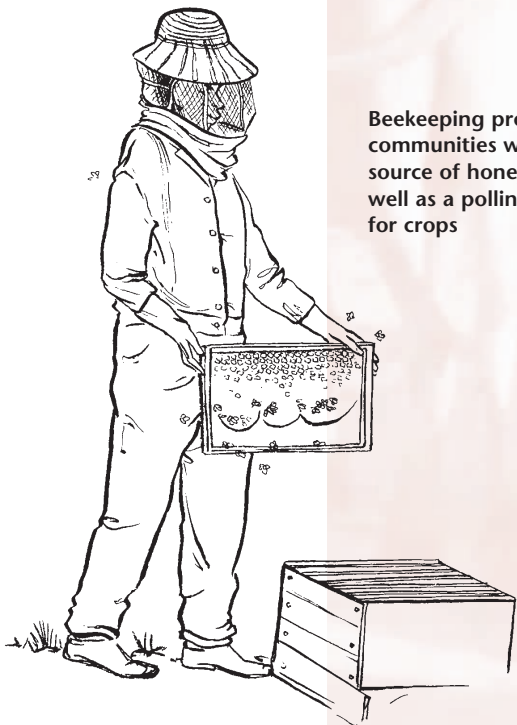
Many species are suitable for this purpose, one of the most versatile being the Nile tilapia, a freshwater fish from Africa. This species, now also found in Asia and Latin America as a result of deliberate introductions, is very productive (its generation interval is just 4–6 months) and thrives on agricultural wastes, making it inexpensive to grow. It has been

dubbed “the aquatic chicken”, because it can be grown in a variety of situations from backyards to intensive “battery” farms.

Although aquaculture has not been widely practised or promoted in refuge or returnee operations, there is considerable potential and benefit to be had from this simple activity. Freshwater fish, a rich source of protein and oils, are generally widely sought after and can be either sold fresh, sun dried or smoked for longer preservation.

4.6.6 Unconventional Livestock Species

A broad range of so-called unconventional livestock species can contribute to the improvement of human nutrition or can provide income opportunities. The spectrum includes rabbits, cane cutters (agouti), guinea pigs, snails, bees, silk worms and many others. Introduction of such species, however, has to take account of cultural habits, infrastructure for marketing and feed availability.



Beekeeping provides communities with a source of honey as well as a pollinator for crops

i Box 7

Mixing Livestock

By keeping several species, small- and large-scale farmers can exploit a wider range of feed resources than if only one species is kept. In pastoral areas, camels can graze up to 50km away from watering points, whereas cattle are limited to a grazing orbit of around 10–15km. Camels and goats tend to browse more on the leaves of shrubs and trees, while sheep and cattle generally prefer grasses and herbs. This way also, livestock-keepers benefit from a broader range of products – camels and cattle can provide milk, transport and draught power, whereas goats and sheep tend to be slaughtered more often for meat, and chickens are commonly sold for small change for the household.

Keeping more than one species of livestock is also a risk-minimising strategy. An outbreak of disease may affect only one species, so that a family does not risk losing all of its assets at once. Advantage can also be taken of the different reproductive rates of different species to rebuild livestock holdings after a drought.

4.7 Encouraging Self-Sufficiency Practices Through Improved Livestock Production

Enhancing an individual or family’s well-being and livelihood security potential is one of the main reasons for keeping livestock in a refugee and returnee context (see also Box 7). One means of influencing livestock management systems – the choice(s) of animals kept, for example – is to examine formal and informal opportunities for marketing animal products or for direct sale or exchange of livestock. Vibrant markets are often associated with refugee camps and settlements once the emergency phase has passed. Livestock are often traded openly and actively at such events between refugees, returnees and local populations, so opportunities for income generation and improved self-sufficiency are quite realistic.

4.7.1 Income Generation through Small Animal Keeping

Small animal production can provide income opportunities and self-sufficiency, particularly for women – a strategy which should be encouraged widely as long as necessary precautions and considerations are taken with respect to possible environmental degradation. As part of their personal or family security strategy,



Income through small animal keeping

women in particular invest in small ruminants until sufficient assets have been acquired to convert this into the purchase of, e.g. a milk cow which, in the longer term, should provide higher benefits to the owner.

The main constraint even for small animal raising within camps or settlements, however, may prove to be a lack of feed. Indigenous breeds of chicken, pigs and goats can scavenge on scarce resources, as long as the overall number of animals is kept low. Pigs can live on residues from human nutrition, and local chickens normally find enough food when roaming around. The introduction of improved breeds

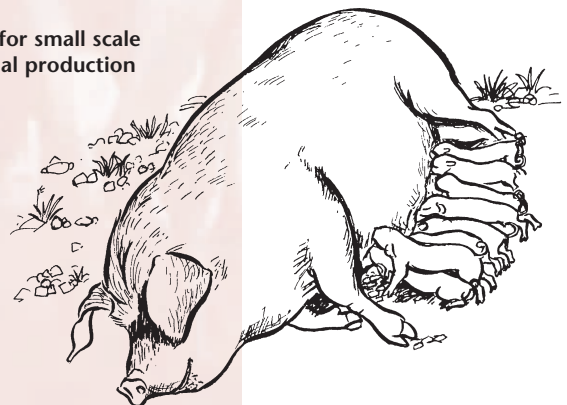
and higher animal densities, however, can only be realised if fodder is provided to the animals. This will need to be purchased or collected locally by the refugees.

Significant income levels can also be generated through the processing and sale of animal products, a range of which is described in Annex IV.

4.7.2 Breeds and Breeding

As with feeding and space restrictions, the choice of animals is also an important consideration, which will vary from a rural to urban setting (see also Section 5.4). In general, local breeds are more adapted to endemic diseases, climate and feed resources. On the other hand, their performance is often low. Breed improvement of cattle, sheep, goats, pigs and poultry can be considered, if the necessary infrastructure, i.e. appropriate livestock services, is available. The economic viability of introducing improved breeds depends on the competitive cost/benefit ratio, which is related to feed costs and to producer prices for livestock and livestock products. If the situation allows breed improvement, breeding centres should be established. These can produce cross-breeds and distribute them to farmers. Breeding programmes, however, should be accompanied by monitoring systems which compare mortality rates, production progress and cost/benefit ratio of local and improved breeds.

Pigs for small scale animal production



4.7.3 Livestock Husbandry in Towns

Keeping animals in towns is common in many developing countries and UNHCR has in the past assisted with the establishment of intensive poultry raising, for example, through micro-credit assistance. Most intra-urban farms and the small-scale peri-urban farms in the vicinity of settlements concentrate on subsistence production by providing animal protein for the family. In addition, these small-scale farms generate income through the sale of products to local markets, through the provision of services (e.g. transport), and of animal manure for crops.

While many opportunities exist for urban livestock production, the accompanying problems should not be overlooked. The transmission of disease from animal to animal and from animals to humans, as well as the difficulty of controlling production hygiene standards, are among the main reasons, why municipal administrations try to ban livestock from their towns. Most legislative actions to expel animals from towns have failed, and urban livestock production is growing at a steady rate. Banning livestock production from towns, however, would deprive the poor and mainly landless families, including refugees, of income opportunities and would worsen the quality of their diet.

4.8 Re-Stocking Programmes

Re-stocking is an option to consider for improving refugee livelihood during the care and maintenance phase and in preparation for repatriation. The main objective of such programmes is to take animals from areas with relatively large livestock numbers and distribute them to refugees who have lost their herds, so as to enable them to regain a measure of self-sufficiency. To date, most of these programmes have been carried out by NGOs on a small-scale,

i Box 8

Donkeys and the Provision of Livestock to Returnees

Livestock are an essential feature of Eritrea's rural economy and food production systems. These systems vary from crop-based highland farming which is reliant on oxen for ploughing to lowland pastoralism involving mixed herds of camels, cattle, small ruminants and donkeys.

As part of the Programme for Refugee Re-integration and Rehabilitation of Resettlement Areas in Eritrea, returnees from eastern Sudan were to have been provided with a livestock package – free to each household – comprising different species of livestock. All returnee households were interviewed in order to determine their preferences for different types of livestock – the budget for each family was set at US\$420, allowing people to select more than one type of animal. Sheep (92 per cent of households), goats (90 per cent) and donkeys (61 per cent) were by far the most popular types of animals: preferences of female and male-headed families were similar. Interestingly, however, personal interviews revealed quite distinct preferences for donkeys, in almost total contrast to species identified in the original project plan, showing again the importance of adequate stakeholder involvement in decisions such as this.

Source: Catley, A. and Blakeway, S. Donkeys and the Provision of Livestock to Returnees: Lessons from Eritrea. In: Donkeys, People and Development, Starkey, P. and Fielding, D. (Eds). ACP-EU Technical Centre for Agricultural and Rural Co-operation, Wageningen, The Netherlands.

sometimes supported by UNHCR. Advance planning here, however, could prove very important (see Box 8). Typically after a drought or when refugees are being repatriated, the demand for breeding female livestock is high and, in consequence, so is the price. This can put the option of an individual or family purchasing livestock out of the question, unless UNHCR or its partners can intervene or have earlier intervened to fix a price with traders. If possible, animals should be purchased only at local markets, or in nearby regions, to avoid any health risks due to deficient resistance. Only in a limited number of cases, when feed is

available and the pressure from livestock diseases or climatic conditions is moderate, should the option of stimulating herd growth, through the introduction of exotic breeds, be considered.

Donation of transport/work animals may become critical in situations where displaced people are supposed to return home by foot over long distances. Depending on the situation, it has to be decided whether animals should be given out for free, or sold either at subsidised or market prices. To stimulate crop production, the supply of draught animals, such as oxen, buffalo, donkeys or camels could be a priority consideration.

Re-stocking operations are costly and only a relatively small number of families can normally be included in the programmes. If only part of a community can be supplied, a revolving animal pool might be created as a livestock bank. Key families would receive a small number of animals, e.g. two pregnant cows, or five sheep or goats. They would be obliged to hand over part of their offspring, e.g. one calf or two sheep (or two goats) per year to other families. Such an operation could be combined with a breeding programme. A small breeding station keeping one bull and five to ten cows or five rams/bucks with 20 female sheep or goats could be established. Through a well managed breeding programme, local breeds could then also be

upgraded through cross-breeding with exotic animals. To be successful, however, breeding goals must be defined taking a broad range of environmental conditions (including seasonal changes), feed availability and prevalence of diseases into consideration. Since most countries have experience with improvement of local breeds, advice on breeding programmes can probably be obtained from national research and extension services.

The number of animals that could/should be given to a family is difficult to determine. Because of budgetary constraints, in most cases only the minimum requirements can be fulfilled. If too few animals are given, the donation scheme is not viable as many of these families will not achieve self-sufficiency and must continue to be supported over the long-term. On the other hand, if families are given too many animals, then the intervention is not cost-effective, because fewer families can be provided with livestock and an imbalance is created.

If households that received support through a re-stocking programme also receive some food aid, their economic viability is improved because they have to sell less stock to buy other commodities, hence they can build up their stock themselves. Experience has shown that pastoral families, restocked with 30 goats each, still depended on other forms of income for years afterwards.

5

From Theory to Practice

5.1 Assessing the Needs and Options

There are considerable differences between helping refugees keep small numbers of poultry within or around their compounds, and supporting the development and maintenance of large herds of cattle or developing intensive chicken units. The level of analysis carried out in assessing available or possible options should therefore take into account a number of issues, including the experience of those interested in keeping livestock, their needs, the scale of the initiative and the anticipated potential for environmental impact. To help assess what is needed and what options might be availed it will help to:

- identify and interpret what, if any, rules and rights apply to keeping livestock in the given situation;
- identify and engage with stakeholders at all levels, especially to determine more about their experience, to identify available resources that would support livestock-keeping, and the needs/preferences of these people;
- assess the prevailing characteristics of the area – the environmental and socio-economic factors that might influence decisions concerning types and number of livestock which might be supported; and
- review and assimilate information to develop an overall profile of the situation.



Team of decision makers assessing needs and options

Recommendations on what action(s) to take should then be shared openly with all stakeholders.

Preparedness planning and policy level work should aim to provide an environment that supports and encourages various levels of livestock production among refugee/returnee and hosting populations. However, where small-stock, including poultry, rabbits or pigs, are kept within the confines of a refugee camp or settlement, it is unlikely that a host government, the host community or agencies will express particular interest or actively impose restrictions. The keeping of larger animals, particularly those that need space and natural resources beyond the immediate limits of a camp is, however, more visible and has a greater impact. This is more likely to meet with the interest and concerns of authorities and locals.

5.1.1 Clarify Rules and Rights

In order to know what limitations and opportunities exist within international and locally relevant legislation, and in agreements and rules

affecting refugee operations, the legal setting must first be considered. What can and cannot be done? Which policies and principles may influence the promotion and adoption of livestock-based activities? For example:

- does host government legislation address livestock-keeping in refugee settings, and what interpretation can be made for the prevailing circumstances?
- does legislation provide any opportunity that can help promote sustainable and environmentally sound practices?
- what agreements relating to refugee livestock production exist between the lead refugee agency and the government, and how is this interpreted?
- which other organisations, institutions or individuals have the right to contribute to debate and decisions, and what are their respective opinions?

Initial consultations should be kept as broad as possible, especially among the local and refugee communities. UN agencies, and UNHCR in particular, other humanitarian organisations, host government organisations and non-governmental organisations (NGOs) all need to be consulted. Specialist advice may be required on certain occasions.

Stakeholder and institutional analyses will help identify and clarify interests and roles, and begin the process of defining responsibilities and rights, i.e. the mandated or inferred responsibilities (in the case of agencies and government entities), and legal or moral rights in the case of refugee and local populations. This will begin to define what can and may be done at that time, and perhaps in the future.

The next step would then be to determine the perspectives and potential contributions of

each. Table 12 outlines one means of addressing this.

Analysis of the above stakeholder rules and rights will allow a number of important issues to be addressed at the outset. Other questions which may need to be posed are the following:

- what level of livestock keeping activity will, or will not, be acceptable?
- who has legal responsibility for what in the refugee setting?
- what local interests and rights must be taken into account?
- how can the interests and responsibilities of each stakeholder be developed into constructive support and/or involvement in refugee livestock production?
- what livestock keeping activities may lead to processes that are likely to have an impact elsewhere?
- what sources of technical expertise, local knowledge and extension skills are accessible/ available, and what processes of appeal, and aspects of monitoring and evaluation, can/must be developed? and
- what other issues have a bearing, and how?

5.1.2 Involved Stakeholders

It is important to understand certain aspects of the culture, interests and needs that one is working with. Project activities have to start with what people know, and acknowledge their attitudes and priorities. It is also important to understand roles and responsibilities, decision-making processes at the household and community levels, as well as factors that might influence these decisions. Answers to such questions will help build a picture of:

Table 12. A Tool for Analysing Rules, Rights and Roles

<i>Issue, or area to analyse</i>	<i>Stakeholders rules, rights and roles</i>					<i>What are the implications or results of this?</i>
	UNHCR	Host Government	NGOs	Local Community Groups	Others	
Which stakeholders have rules (including policy statements, regulations and decrees) that have a bearing on the use of resources and the establishment of agricultural activities? Provide a brief interpretation of the rules for each stakeholder.						Consider: do they say the same thing; what are the implications?
Which organisations, agencies or government departments have a legal responsibility for the land and or resources of the area, or are affected directly or indirectly by refugees? Provide a brief interpretation of responsibilities for each stakeholder.						Consider: how these interests and responsibilities can be taken into account?
Which communities have a legal right or acceptable claim on the land and/or resources of the area? How can their rights, interests and needs be reflected? Provide a brief summary of the respective claims of each.						Consider: how can any conflicting rights, needs and interests be resolved?
Who has formal responsibility for supporting and guiding livestock production and livelihood development; what is their mandate and are they in a position to pursue this? Provide a brief summary for each.						Consider: where more than one actor has an interest, can the respective interests and resources be combined?
Which communities are affected by the use (and misuse) of resources in the refugee affected area? Provide a brief summary of 'who' will be affected by 'what'.						Consider: how can their interests and needs be taken into account?
What approaches will each stakeholder take in contributing to the design, planning, support, and monitoring of agricultural activities? Provide a brief summary of each.						Consolidate the interests and needs.
Other issues/areas are likely to be identified when planning and undertaking this analysis.						

- who makes decisions relating to livestock keeping activities? Men, for example, more commonly look after cattle, while women often tend to be responsible for sheep or goats, but young men – even children – are often made responsible for herding.
- who within the community – refugee or local people – may influence decisions?
- what sort and number of livestock have refugees arrived with?
- what sort of livestock keeping are the refugees familiar with?
- what do people need to know in order to make decisions about keeping livestock? What influences their decisions (i.e. their backgrounds, needs, knowledge, skills and attitudes)?
- which local or refugee organisations can be supportive to livestock keeping activities?
- identify specific vulnerable resources within the area that should be protected from livestock;
- recognise any particular threats to livestock keeping, such as theft, and competition for grazing and browse with host community livestock;
- be aware of the diseases, and other risks to livestock, that are prevalent, or may occur in the area; and
- become familiar with the traditional uses of refugee hosting areas.

If livestock-keeping is anticipated, particularly where cattle, sheep and goats or other larger animals will be maintained in significant numbers, it is advised that an environmental assessment be undertaken to gauge the potential social, economic and environmental impacts that might arise and be prevented or contained through responsible and timely actions. Reference should be made to UNHCR's guidelines on Environmental Assessment (UNHCR, 2005).

5.1.3 Characteristics of an Area

In every setting where livestock keeping is being considered, it is essential to:

- understand the prevailing environmental conditions – climate, water resources, soils and vegetation types – to influence the selection of livestock and determine its carrying capacity;
- identify features or areas that may impact on the health and productivity of animals in the refugee-affected area;
- identify areas that may be harmed by livestock, such as protected areas, highly fragile or highly valued areas, sacred sites, crop fields and water resources, and where livestock may cause problems to people;

5.1.4 Putting the Pieces Together

While it is easy to gather large volumes of information, it is often more difficult knowing how to interpret it and, especially, what to do with the results.

The most useful, practical action at this stage is to try and develop a simple overview and strategy of the situation – present and potential. This could either be written or drawn, and is best carried out as part of a team exercise involving local stakeholders, so that they are not excluded from the outset. Key issues to bear in mind when elaborating a strategy for livestock-keeping are:

- rules governing livestock (especially larger animals) keeping;
- availability of water points;
- availability of seasonal fodder and siting and access to grazing areas;
- livestock-keeping practices of local communities, and nomads if present in the area;
- disease prevention and control;
- marketing opportunities;
- livestock management responsibilities - who will be responsible for herding and the like; and
- off-limit zones – sites of high biological or cultural diversity or lands being restored – which may be seasonal.

Consideration and discussion of the above points will enable a more detailed and relevant response to then be taken in relation to livestock-keeping. This broad strategy should be reviewed if conditions alter, including for example if herd size or composition alters.

5.2 Supporting Livestock-Keeping Activities

5.2.1 Training And Extension Support

Livestock projects are likely to require support at a number of levels. People with little practical experience but a desire to engage in livestock-keeping for example as a means of income generation will need considerable initial guidance with the selection of appropriate animals and livestock production systems. More experienced livestock owners will not require this level of attention but may require or benefit from information on disease control, improved

feeding possibilities, and generally more appropriate management given the situation in which refugees and returnees find themselves.

Guidance and support may also be required where some degree of commercialisation develops, where small products are preserved or sold, or where larger livestock are slaughtered regularly for market. In such instances, livestock keepers will require extension support and training, and access to specialists with animal health knowledge and veterinary skills and drugs. At the same time, regulatory measures might need to be set in place to ensure that the trade in meat is supervised and controlled to protect consumers from disease and contamination.

Much of the regulatory work is addressed within the public and environmental health components of UNHCR's work in refugee-related operations. Specialised agencies, usually responsible for sanitation and waste management, the trade in foods and foodstuffs, and environmental education, will be mandated to develop suitable slaughter facilities and effective meat inspection systems. It is important, however, to refer to the responsible agency to clarify their roles and responsibilities, and to determine any specific issues relevant to livestock-keeping (e.g. the incidence locally of outbreaks of notifiable diseases or other epidemics that will affect project development and livestock production).

More effective systems of livestock production will also benefit from the following:

- understanding which training and extension strategies best address the local circumstances and needs of the people;
- a cadre of technically competent resource persons with good communication skills;

- access to field inputs and mechanisms to ensure their effective distribution; and
- consideration of how support for livestock production will continue beyond the life of any external assistance to the project.

Managers and implementing agencies should identify as quickly as possible what skills relating to livestock-keeping are available among the community. Extension systems should then be designed around these skills, but also to take account of other people who do not have the same level of skills but who are nonetheless keen to engage in this sector in one way or another. This will help the latter group in particular to get started and to minimise any environmental risks, while at the same time maximising their own livelihood benefits from livestock. Building further on this platform, extension services can and should help refugees and returnees become gradually more self-reliant through helping them become:

- **knowledgeable and skilled** in selected livestock-keeping activities;
- **committed** to adopting and practising livestock-keeping activities that are locally appropriate, i.e. suited to the prevailing ecological conditions, and respectful of host community economic activities and cultural sensitivities;
- adept at accessing **resources** necessary for the identified production systems (e.g. handling and veterinary tools and medicines); and
- willing to commit the **time and physical effort** required to establish and maintain the enterprises selected.

Animal health services will provide an entry point for working with livestock owners. People may not seek technical advice on livestock-keeping, but frequently require assistance in addressing veterinary problems (diseases and injuries etc.) and access to veterinary medicines. A network addressing animal health will require:

- adequate levels of knowledge and skills among animal health workers;
- access to the relevant tools/equipment and veterinary medicines;
- mechanisms to finance these workers and recover costs of medicines used;
- mechanisms to ensure the animal health workers are accountable in their work and use of medicines; and
- support, as possible, from veterinarians.

These animal health workers will also function as extensionists, bringing knowledge and new skills to livestock owners, and improving management and production systems.

5.2.2 Monitoring

As with any activity, close monitoring is essential and will be the successful and timely intervention in any aspect of an initiative to support livestock-keeping and sound management. Given that there are so many possible aspects to such initiatives it is impossible to provide a blueprint for monitoring. Instead, it is recommended that once essential baseline data have been gathered in relation to the specific activities, clear and measurable indicators should be identified with representatives from the participating communities and implementing agencies, with clear responsibilities identified and assigned to individuals or groups of people to monitor particular aspects or actions.

Regular meetings should be arranged with interested stakeholders to ensure that information gathered through the above process is shared in an open, regular and timely manner,

enabling corrective actions to be taken. Possible indicators are given in Annex III to help users assess some of the environmental risks commonly associated with livestock keeping in refugee and returnee situations. Others, howev-



6

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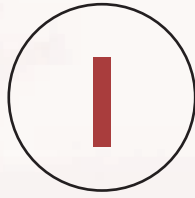
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Which Livestock for which Situation

Keeping Bees

Introduction

Bee-keeping is a low cost activity requiring only basic skills and a few resources to provide honey – a valuable energy food that has a wide range of other values, including medicinal usage. The better the bee-keeping skills and knowledge, the better the honey yields that can be expected.

Environmental conditions

Bees can be kept in temperate, semi-arid and tropical conditions where there is abundant vegetation providing blossoms/flowers regularly through the year, and for long periods of time. Bees need access to water.

Environmental issues

Bee-keeping is probably one of the most benign livestock husbandry activities, with few if any negative, and many positive, environmental implications.

However, bees collect nectar from flowers, including those of agricultural crops. Where pesticides are used, the nectar may contain traces of these chemicals, which will then be present in the honey. Some pesticides will affect, and may kill, bees: if the bees carry pesticide into the hive, whole colonies may be lost.

Social issues

People are most likely to object to bee-keeping because they are afraid of bees, and this is only likely to happen when they are aware of their presence. Careful siting of apiaries (groups of beehives together in one place) is important so that flying bees and the hives themselves are not interfered with. This is achieved by placing beehives high in trees (so they cannot easily be reached and the bees do not fly at a height where they encounter people) or next to hedges (so that they are less conspicuous, and so that the bees fly up and over obstacles and are above head height).

Production systems

The three most important aspects of basic beekeeping in a refugee setting are:

- locating beehives so that bees have access to flowering plants (from which to forage for nectar) and water;

Unmanaged bees can become a social issue



- ▶ a secure site where they will not be disturbed and honey will not be robbed or taken by pests, where bees will not be affected by pesticides, and where the bees will not disturb people; and
- ▶ good honey harvesting practices – achieving maximum yields while leaving sufficient store for the bees' own use, or harvesting in time for the bees to rebuild sufficient honey stores for them to survive less productive periods of the year, i.e. when nectar is not available.

Bee-keepers need to know:

- ▶ the flowering plants of the area, and the seasons in which they flower;
- ▶ basic skills in handling bees, particularly how to harvest honey without damaging the colony of bees; and
- ▶ how to handle and process honey to ensure it is clean and not contaminated, and is not spoiled when separating honey from wax.

Setting up

Most rural communities have people experienced of bee-keeping: necessary skills will almost certainly be found among the refugee/returnee community. The most appropriate approach will be to identify these people and begin to review their experience, needs and the potential for keeping bees or perhaps improving ongoing honey production practices. This will extend to natural resource management and land use planning. Bees are particularly suitable where specific areas need to be protected from overgrazing and cultivation, providing an alternative productive activity that complements conservation activities, e.g. in wooded catchment areas and in riverine woodland.

Keeping Rabbits

Introduction

Rabbits are easy to keep, easy to breed and provide a good source of meat. Production costs are negligible, once simple housing or pens are constructed, and little effort is required. In many parts of the world children adopt this activity. Rabbits are fed on green vegetation including vegetable scraps, and require little water. Manure from cages can be added to compost pits.

Environmental conditions

As they are usually housed, rabbits will do well in almost all conditions.

Environmental issues

For domestic rabbits there appear to be very few environmental issues. The greatest issue may be the attraction of snakes and other predators to areas around pens.

Social issues

There are many local social issues associated with eating rabbit and the meat is not widely eaten in many cultures. Sometimes the meat is only given to children. In terms of social interaction between households, and between refugees and host communities, there is unlikely to be any basis for conflict.

Production systems

Some key aspects of rabbit-keeping in a refugee setting are:

- ▶ controlled breeding, to provide a regular supply of animals for the table and to prevent in-breeding;
- ▶ providing a regular supply of fresh feed; and
- ▶ secure housing or pens to prevent predators from taking the animals.

Keepers of rabbits need to know:

- ▶ what plants and other feeds to provide, and from where these might be sourced;
- ▶ good animal husbandry and hygiene practices; and
- ▶ how to sex, handle, manage, slaughter and process rabbits.

Setting up

Many projects introducing and providing training on rabbit production work through community groups. As rabbits breed so prolifically an initial training and demonstration unit can soon provide breeding animals to group members. As breeding is such a critical aspect of rabbit production there is need to ensure a good pool of breeding animals to exchange regularly within a community.

Keeping Poultry

Introduction

Poultry keeping is a low cost activity requiring only basic skills and few resources to provide eggs and meat. The main types of poultry kept in refugee and returnee operations are chickens, ducks and turkeys. They provide a valuable source of protein with few inputs, little cost and minimal effort.

Environmental conditions

Poultry can be kept in almost any conditions from temperate, to semi-arid and tropical conditions. They thrive on kitchen and crop wastes, and, like pigs, are excellent scavengers.

Environmental issues

Poultry-keeping can be a very low impact activity when birds range freely around settlements. They can have a positive impact on vermin, disturbing and discouraging snakes, eating insects and grubs, and consuming wastes that might otherwise attract rats or mice. They are only likely to have negative impact when kept in small areas and droppings accumulate, with pollution risks.

Local, or locally adapted breeds of poultry are most suitable as they are likely to thrive and produce, coping with local conditions, pests, diseases and predators. Exotic/improved breeds are only suitable for intensive systems where high quality feeds and medicines can be obtained on a reliable basis.

Chickens are, however, vulnerable to pests and diseases and require medications to address a wide variety of ailments, from external parasites to viral, bacterial or protozoan infections. Ducks are probably the most robust of these domestic birds, unlikely to suffer major ailments and capable of tolerating a wide variety of climatic conditions.

Social issues

People seldom object to poultry-keeping unless the birds become a nuisance, damaging kitchen garden crops, entering kitchens and scavenging for food in inappropriate places.

Production systems

Important aspects of basic poultry-keeping in a refugee setting are:

- good housing for the birds at night, to prevent theft and losses through predation;
- pens to keep the birds in for at least a proportion of the day in order that eggs are laid where they can be collected, and chicks can be protected from predators; and
- access to and knowledge of the preparation and use of proprietary or traditional medicines to control diseases and parasites.

Poultry keepers need to know:

- how to recognise and control pests and diseases; and
- how to maximise production by feeding.

Setting up

Most communities have people with experience of poultry keeping, so some experience of poultry-keeping is likely to exist in the refugee population. Refugees may have brought poultry with them, in which case poultry keeping is likely to be spontaneous. Any strategy to expand and improve poultry-keeping should be based upon what skills and birds already exist. One particular area to address fairly early in any intervention is building on and sharing the knowledge of local people and refugees on traditional poultry cures and treatments, using locally available ingredients such as plants.

Keeping Fish

Introduction

Aquaculture has considerable opportunities and practical benefits for use in a refugee or returnee situation. Only simple arrangements are needed, and inputs are minimal. If linked with agricultural practices, additional benefits can be expected. Duck farming, for example, goes hand in hand with semi-intensive aquaculture, while ducks also help control snails that can damage certain crops. Species commonly used in this form of aquaculture include tilapia, catfish and carp.

Environmental conditions

Fish can be kept in most climates although this becomes more difficult and less productive in cold regions. Ponds should be established well away from rivers, lakes or streams to prevent fish from escaping and entering natural ecosystems. Some shade might be required in particularly hot climates, to protect the fish but also to help reduce evaporation.

Environmental issues

Semi-intensive freshwater ponds have few negative environmental effects. In the tropics, where there is a fast turnover of organic materials, effluent and excavated sludge from ponds can be used as a fertilizer or to enrich other ponds. Some care needs to be taken to prevent over enrichment of ponds. Care also needs to be taken where ponds may disturb the subsoil, where the water table is high, or where there is a risk of flooding as the latter could wash rich concentrated water from a pond to other water sources. The use of chemicals in semi-intensive aquaculture is usually limited, but precautions need to be taken wherever antibiotics or other drugs are used.

Wherever possible, only native fish species should be stocked, thus preventing the risk of exotic species escaping from ponds and perhaps establishing new populations in nearby rivers and lakes, an action which can have disastrous impacts on local wildlife.

Social issues

Fish-keeping is more popular in Asian culture than many others, but there are few reasons why this should not become more widely adopted. While concerns are often expressed over the fact that freshwater ponds may assist the spread of certain waterborne diseases through harbouring the intermediate hosts of parasitic worms such as bilharzias, and can be breeding sites for mosquitoes, such problems are minimised by maintaining weed-free, well-stocked ponds. Ponds stocked with appropriate fish stocks can even help reduce the spread of water-born diseases since the fish feed on such organisms. What is important is for farmers to be aware of which water-born diseases are present in their locality and to know how to take preventive measures. The presence of a well-trained

extension agent at a site could be a critical factor to ensure well-managed ponds and thus reduce the risk of waterborne disease.

Attention also needs to be given to individual roles in fish keeping: in some societies, women may not be permitted to catch fish, but they may be the ones who sell them. Sometimes people believe that certain foods are unclean or will make them sick. For example, many people refuse to eat fish raised on animal excreta for these reasons.

Production systems

Freshwater ponds can be highly productive in their own right, even without considering the benefits of integrating these into an appropriate agricultural scheme. In Malawi, for example, in regions that have continuous water, ponds can yield an average of 1,650kg of fish per hectare of pond per year, while for the rain fed ponds, which are dry for part of the year, productivity is still more than 1,300kg per hectare per year.

Among the most important aspects of keeping fish in a refugee setting are:

- ▶ the siting of the pond(s), e.g. to collect rain, but also for safety reasons least people or livestock fall into ponds;
- ▶ choice of stocking species;
- ▶ cultural acceptance of fish keeping in semi-intensive conditions; and
- ▶ making the most of beneficial links with agricultural activities, to increase outputs.

Keepers of fish need to know:

- ▶ how to select good stock fish for breeding purposes; and
- ▶ good pond hygiene practices.

Setting up

Land-based systems (such as ponds, rice fields and other facilities built on dry land) are probably the most realistic option for semi-intensive aquaculture, the other being cages, pens or rafts suspended in water bodies. Ponds are the most common of all aquaculture systems and range from small, rudimentary, gravity-fed facilities to large geometric ones, constructed using machines and with sophisticated water management regimes. Carps and tilapias, both widely cultivated fish species, are commonly grown in freshwater ponds, whereas shrimp and finfish which are tolerant to more saline waters are cultivated in brackish water ponds.

Keeping Pigs

Introduction

Pigs are often kept in small numbers and fed on household scraps or allowed to scavenge for wastes. Pigs are also good cultivators, using their snouts to dig over the soil in search of roots and tubers. They are unlikely to be costly to obtain (locally) and require minimal skills and resources to keep and maintain them. The critical factor will be having access to sufficient feeding materials. Keeping pigs in enclosures and providing all their feeding and water needs is a better, cleaner and more productive system but requires more capital for constructing pens (which need to be strong, as pigs are very destructive) and more effort (to collect and supply feeds).

Environmental conditions

Pigs will do well in almost all conditions providing they have adequate feed, water and shelter from the elements. They need shade and additional water in very hot climates, as well as shelter in persistent cold wet conditions.

Environmental issues

Public health issues are the main problems with keeping pigs. Pig droppings attract flies and other pests and are likely to carry the eggs of internal parasites that can be passed on to humans. These risks are greatest where pigs are free-ranging around a settlement, leaving their droppings around homes. People are less likely to come into contact with faecal matter when pigs are penned, but this leads to a concentration of wastes in a single place. Accumulated wastes in pens are less likely to dry out and will encourage flies; without good control and frequent cleaning wastes can, especially during rain, contaminate drainage ditches and water resources.

Social issues

Pigs are scavengers by nature and if let loose in almost any area will find food – occasionally damaging kitchen gardens and other crops, and looking for opportunities to enter cooking areas. This, as in any situation, can lead to disputes between neighbours, so some degree of pig control is often required.

Pigs are the subject of religious taboos in many cultures, and the adoption and promotion of pig-keeping by refugees must be considered against the sensitivities of host communities (or other refugees), particularly if people are likely to come into contact with them.

Production systems

Important aspects to consider if keeping pigs in a refugee setting are:

- ▶ recognising any social or religious taboos among refugees and host communities;
- ▶ ensuring adequate feed to keep animals healthy and productive; and
- ▶ ensuring that animals are controlled to prevent damage to kitchen gardens and other crops and foods.

Keepers of pigs need to know:

- how to handle and manage pigs;
- how to castrate male piglets; and
- how they are going to obtain adequate feeds of the right kind and balance to maximise production and maintain health.

Setting up

Pig-keeping is likely to be a spontaneous activity in a refugee or returnee setting, and programme efforts will most usefully address management aspects to improve public health, encouraging the penning and feeding of animals.

Keeping Goats and Sheep

Introduction

Sheep and goats (frequently termed shoats) are often maintained in combined flocks/herds. Although their feeding habits are different (goats browse on shrubs, bushes and small trees while sheep graze on grasses) their management is similar, with similar needs and inputs. Mixed flocks of shoats maximise the use of vegetation and buffer each other in times of environmental stress – most breeds of sheep are generally robust and cope better with drought (but loose condition during rains), while goats are more productive during wet seasons but are less tolerant to drought. Goats are better scavengers, using household waste and consuming a wide variety of feed, whilst sheep tend to be fairly fussy feeders.

Most shoat systems are extensive, apart from certain breeds of dairy goat which may be zero grazed with quality home-grown fodder. Zero grazing one or a small number of goats can be achieved with minimal inputs – a small pen and access to fodder trees, vegetable kitchen wastes and other high value feeds. Sheep and goats are generally relatively inexpensive to acquire and maintain, and require minimal management skills.

Environmental conditions

Different breeds of sheep and goats are kept in a very wide range of environments, from cold and wet to hot, dry conditions. In wetter, more productive, environments more animals can be maintained in a given area. Goats generally do better around settlements, reflecting their effectiveness in scavenging food.

Water requirements for both animals are modest.

Environmental issues

Sheep are fairly good grazers, seldom damaging grassland unless the stocking density is too high. Goats can be more destructive, especially damaging tree seedlings and other young plants. High numbers of goats in an area can, over a sustained period, cause serious damage to the vegetation, particularly in dryland areas.

Where sheep and goats are treated with acaricides, to control external parasites such as ticks, the treatment areas, and the disposal of the wash and containers, must be considered. These chemicals are toxic to animals, birds and fish, and the potential for contaminating water resources (both natural and piped/stored) must be considered.

Social issues

Small numbers of sheep and goats kept in and close to refugee camps are unlikely to lead to problems, but unsupervised animals can do extensive damage to crops and young trees. Within camps, where tree planting activities are undertaken and kitchen gardens are maintained, the poor management of sheep and goats can lead to friction between households and ruin tree planting programmes.

Where larger numbers are kept and flocks are taken out of camps into the surrounding area, access to sufficient land (and vegetation) is likely to be the greatest issue. As sheep and goats tend to move smaller distances from camps – than either cattle or camels – their impact is more localised and is therefore more likely to be destructive. Damage to host community crops and degradation of natural vegetation is very visual and can lead to conflict.

Production systems

The three most important aspects of keeping sheep and goats in a refugee setting are:

- ensuring animals are controlled to prevent damage to tree seedlings, kitchen gardens and field crops;
- routine control of internal and external parasites; and
- ensuring host community acceptance of shooat keeping in areas outside of the camp/settlement.

Keepers of sheep and goats need to know:

- the implications of poor supervision of their animals (in terms of the environmental and social consequences);
- how to handle sheep and goats, to maximise production through controlled breeding or providing feed supplements; and
- how to prevent and treat diseases.

Setting up

Small numbers of sheep and goats are likely to be kept in most refugee camps, spontaneously. Outside intervention might help identify ways in which productivity and production can be increased, and how the destructiveness of animals in and around camps/settlements might be controlled and avoided.

Keeping Cattle

Introduction

There are many systems and levels for keeping cattle, reflecting the purpose for which these animals are kept, the ecology and climate of the area, and the breeds adopted. The simplest systems are based on local cattle that are adapted to prevailing conditions, and extensive land use which allows cattle to range over wide areas to forage for grazing. At the other extreme, improved breeds of cattle are penned and fed with purpose-grown feeds in a balanced ration that maximises milk production or growth rates for meat production. These varying systems have very different cost implications and require different skills and resources.

Environmental conditions

Cattle are kept in a wide range of environments, from cold, wet situations to hot, dry conditions. As a general rule, the drier the environment, the larger the land area required for each animal.

Like sheep, cattle are grazing animals and feed almost exclusively on grass. Cattle require large amounts of drinking water every day.

Environmental issues

Cattle can be destructive feeders in dryland areas, grazing plants low to the ground, disturbing the roots and compressing the soil. Overgrazing can lead to changes in the composition of plants in an area, and even the loss of vegetation, leaving the soils bare and vulnerable to erosion.

Cattle are also large and heavy and their continued movement in large numbers over the same pathways to and from camps can lead to loss of ground vegetation and the structural breakdown of soils. This can lead/contribute to dust problems in and around refugee camps, as well as other forms of erosion.

Where large numbers of cattle are kept in pens – either permanently or at night – the accumulation of droppings can be a valuable source of manure for gardens and farms. If the pens are poorly sited, however, rainwater and effluents may contaminate water resources, and pests and vermin (particularly flies) are likely to become a localised problem and possible disease vector.

As with sheep and goats, where cattle are treated with acaricides, to control external parasites such as ticks, the treatment areas, and the disposal of the wash and containers, must be considered.

Social issues

As with all extensively grazed or browsed livestock, access to sufficient land and vegetation is likely to be the greatest issue. As extensive production systems are inherently less productive, more animals must be kept in order to provide the meat and milk required.

The area required for rangeland cattle-keeping for a small refugee population may be quite extensive. This may not be acceptable to host communities. As an 'out-of-camp' activity, any support to extensive cattle-keeping by refugees must be based upon negotiated agreements with local people and the local administration. Cattle can also do significant damage to crops in a short period of time: crop damage in turn can lead to major disputes between those growing crops and those owning the cattle.

More intensive systems may also pose difficulties between host and refugee communities. While fewer animals may be needed, better quality feeds are required. One of the easiest ways to produce quality feedstuffs for cattle is to enclose areas of good grass, and cut and carry the grass to the animals. This, however, may result in the enclosure of areas around camps by refugees to protect it from other grazing animals – an activity that may not be acceptable locally. Again, such arrangements must be agreed between host and refugee communities.

Production systems

Important aspects of cattle keeping in a refugee setting are:

- ensuring host community acceptance of the activity;
- ensuring access to adequate water and grazing/feed (year round) for the number of cattle to be kept, and that grazing and watering of livestock does not lead to conflict with local communities; and
- controlling parasites.

Cattle-keepers need to know:

- how they are going to maintain the levels of feeding required and/or the productivity of grazing areas;
- how to effectively manage the breeding of cattle;
- how to handle cattle;
- how to prevent and treat diseases and control ticks and worms.

Setting up

Interest from within the refugee/returnee community, and the ability to acquire cattle, are the first concerns to address, alongside the feasibility and acceptability of keeping cattle in the area. If findings are positive, the next step would be to review land use planning systems (e.g. for grazing/watering needs and rights) and establish means of avoiding livestock damage to crops and natural vegetation. Additional considerations are to determine how to provide animal health resources, strengthen existing husbandry skills, and ensure benefits to the wider refugee population/host community.

Keeping Camels

Introduction

Camel husbandry requires knowledge of the species, and basic skills in livestock handling and management. Although often expensive to purchase, camels require few external inputs. They are an important source of milk and meat in many cultures.

Environmental conditions

Keeping camels is particularly appropriate in dryland areas, but they require access to considerable areas of land for browsing. They thrive in arid and semi-arid conditions, where cattle and sheep are less suitable, feeding on bushes and trees. Their water requirements are fairly high, although many breeds do not need watering every day.

Environmental issues

Camels can be destructive if kept in limited areas, damaging seedlings and affecting vegetation through heavy browsing. Camels are, however, generally considered to do less damage to the environment than cattle.

Social issues

Access to sufficient land and vegetation is likely to be the greatest issue. Camels require extensive areas over which to graze, which may not be acceptable to host communities both in terms of access to adequate range and concerns over damage to crops. As an 'out-of-camp' activity, any support to camel-keeping by refugees must be based upon negotiated agreements with local people and the local administration.

Among refugees, individuals already familiar with camel-keeping are those most likely to wish to pursue this activity.

Production systems

The most important aspects of basic camel-keeping in a refugee setting are:

- ensuring host community acceptance of the activity;
- ensuring that local climate and natural vegetation are suitable;
- ensuring that adequate land is available; and
- adequate knowledge and skills in camel handling and husbandry.

Camel-keepers need to know:

- the productive browsing areas, and means for maintaining and maximising that capacity in the medium- and long-term; and
- how to effectively manage camel breeding.

Setting up

With interest in camel-keeping among the refugee population, the feasibility and acceptability of keeping camels must be the first issues to explore. If policy, spatial, environmental and socio-economic conditions permit, the most realistic approach is likely to allow those refugees with experience and continued interest in camel-keeping to access camels. This will build upon local land-use planning and ensuring accountability in reducing livestock damage to crops and natural vegetation, particularly to young and regenerating plants. This experience can then be used to build on existing husbandry skills, and ensure broader benefit in the wider community.



Checklist for Livestock Management in Refugee Situations

Classification of refugees and their former experience, according to their production patterns (farmers, agro-pastoralists, pastoralists)

Animal census (number of refugees' animals): if this is not possible, estimate total numbers

Animal census (number of local animals): if this is not possible, estimate total numbers

Stocking rate (number of animals/hectare)

Type of herds (single-species or mixed herds)

What is the range condition (present state, seasonal fluctuations, future potential)?

Are there any signs of soil erosion?

Availability of livestock feeds

- crop residues
- agricultural and industrial by-products
- unconventional feeds

Seasonal movement pattern of animals, including the presence of nomad herds

Occurrence of livestock diseases

Optional disease control strategies:

- what is the probability to prevent outbreaks with a particular strategy?
- what is the time frame and the certainty to terminate outbreaks with this strategy?
- how is the benefit-cost relation of the strategy?
- will the livestock owners participate in the strategy?

- how will the strategy influence the performance of the included animals?
- will the working conditions of the veterinary service be improved during implementation of the strategy?
- are the resources needed (budget, manpower, transport, vaccines, drugs, etc.) available or accessible?

Zoonotic diseases (main: tuberculosis, brucellosis, tape worms, rabies)

Water points (locations, conditions)

Livestock markets and prices

User groups (range associations, etc.)

Key institutions involved (e.g. Ministry of Agriculture/Livestock; Department of Livestock Development; Regional/District Livestock offices; Research and Extension services)



Useful Indicators to Assess Environmental Risks Commonly Associated with Refugee Livestock

Number of animals per hectare (specified for each species)

Herd composition (% specified for species, age, sex)

Number of animals per household

Number of animals per human population

Biomass production (tons/hectare)

Plants and plant species composition, especially in perennial grasses

Vegetation cover (%)

Livestock prices

Productivity rates: fertility, parturition interval, age at first parturition

Meat production per animal/average daily weight gain (g/day)

Meat production per area (tons/hectare)

Disease incidences (% – number of new cases/total number of animals)

Crude mortality rate (% – number of animals died/total number of animals)

Disease incidence of zoonoses in humans (%)

Number of conflicts over grazing rights and water resources

Fish and wildlife stocks locally and in other regions of the host country (downstream)

Protected areas – local/community, national or international

IV

Processing Animal Products

Three of the main products from livestock are meat, milk and eggs, the production of which may vary during the course of the year. At times there will be shortages but there will also be periods of surplus. Shortages are best offset by processing surpluses in times of plenty in order that food can be stored until needed.

Animal products such as milk and meat are difficult to keep over long periods. They can spoil and become unsuitable for human consumption in a matter of hours, particularly in hot and unhygienic conditions. A range of preservation techniques exist, including heating, smoking, salting, fermenting (to produce lactic acid) and drying. For example, dried, smoked or salted meats are prepared to preserve the meat and to change the flavour and texture to increase variety in the diet. Many require basic skills, equipment and knowledge, but especially important is good hygiene and storage conditions. An indication on how to process and preserve some of the most commonly available livestock products is indicated below: more details can be found in the suggested reading list.

Processing Milk

Milk deteriorates rapidly – it ‘sours’ because bacteria live and develop in it. Most systems for preserving milk are based upon removing water from milk, and/or changing its acidity in order to create an environment unsuitable for most organisms. Fermented milk products such as yoghurt and soured milk contain bacteria that aid digestion and help prevent illness caused by other bacteria. Fermentation also removes milk sugar (lactose) from milk and facilitates digestion of the product. Traditional sour milk is a thick clotted product similar to yoghurt but with a stronger flavour and a more acidic taste. It has a shelf life of three to eight days and is used as a drink or as an accompaniment to meals in some countries. Preservation is due to the production of lactic acid by naturally occurring lactic acid bacteria in the untreated milk. Other examples of processed dairy products are cheese, butter and condensed milk.

Cheese Making

Various types of fresh cheeses can be made with simple equipment – a pan or container and some lemon can be enough to prepare simple but tasty cheese. Cheese making uses specific bacteria to process the cheese, turning the fats in the milk to solids. The liquid is separated and the fats are pressed and matured. The end result is a dry product which has a high acid content. The dryness and acid combine to keep it stable so it can be stored – suitably protected from the air, dampness and vermin – for long periods of time.

Butter Making

Traditional butter and ghee are made by stirring sour milk until the fat coagulates and separates into the solid butter (fat) and liquid buttermilk. The butter is collected by hand and washed with clean water two or three times before packing for storage. This butter can then be heated to evaporate any remaining water. The result is ghee, a highly valued cooking and frying ingredient, particularly in Asia.

Condensed milk

Condensed milk is a combination of dehydrated milk and sugar. The sugar is added to the milk as it is heated and the water is slowly boiled off, resulting in a white syrupy liquid that, when kept in airtight jars, will keep for very long periods of time because it now contains no water and the sugar serves as a preservative.

Yoghurt

This involves the use of a culture – bacteria that are seeded into freshly sterilised milk, which turns it into a fairly acidic creamy product. The water is not separated. The yoghurt stays fresh because of its acidity, the result of the bacteria's activity. Yoghurt does not keep for very long, but its life is extended by sealing it in airtight containers.

Processing Eggs

It is unlikely that eggs will need to be preserved, because production in most parts of the world occurs throughout the year. However, where there is some degree of seasonality with extremes of abundance and none, there are methods for increasing their shelf-life. Eggs should never be washed with a liquid and then stored because water dissolves the protective protein cover on the outside of the shell that stops air getting into the egg itself. It is the deterioration, over time, of this protein layer that allows bacteria to grow inside the egg.

One of the most satisfactory, reliable and inexpensive means of preserving eggs is to glaze them by placing them in a solution of soluble glass (sodium silicate) and then letting them dry in the air. Sodium silicate can be obtained from most pharmacies, and should be used as follows: 1 part sodium silicate to 9 parts water. This system allows eggs to be stored in good condition for many months.

Processing Meat

The same principles of preservation apply to meat as to milk – the moisture in meat is what leads to its deterioration. Techniques for preserving meat therefore rely on removing the water and changing its acidity. A number of options are available.

Biltong or Jerky

Biltong is made from strips of dried, salted meat, which are dark brown with a salty taste and a flexible, rubbery texture. Cattle, camels or wild game are the most commonly used meat for biltong. Fresh, lean meat is cut into long thin strips and hung in a dry hot airy place where dust and insects cannot spoil it. Evenly spaced strips are hung on a string suspended in a well ventilated, dust-free area

and left to hang for five to seven days. As the meat dries it darkens and becomes a fairly hard but nutritious product that can be stored for long periods of time. Some processes involve soaking the meat in vinegar and herbs, or adding spices, to soften it, increase its shelf-life and add flavour.

Salted meat

Some meats can also be salted. In this process, fresh joints are soaked for a number of days in brine (a strong salt solution), before being wiped dry. Salt is then rubbed into the meat, a process that needs repeating periodically – the salt preventing bacterial growth on and in the meat. Meat can also be left to soak in a strong brine solution, if sealed in airtight containers. Prior to its use, as much salt as possible is washed out of the meat before cooking.

Smoked meat

Joints of meat can also be preserved very effectively by smoking them –suspending them in special containers that produce wood-smoke from sawdust from selected trees. The smoke works by partially drying the meat and sealing its surface from further oxygen penetration.

Sausages

Meat also can be preserved by setting it in fat. In this process, the meat is cut or ground into small pieces and mixed with fat, herbs and spices. The fat seals the meat from air. The sausages are then smoked to further preserve them: the herbs and spices also contribute to preventing the meat from deteriorating.



UNHCR's environmental activities are designed to prevent, mitigate and, when necessary, rehabilitate the negative effects of the refugee camps/settlements on the environment so as to secure the welfare of the refugees and local populations, and foster good relations with host governments who provide asylum to refugees.

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