

# Appendix

## Overview of Recommendations for Optimizing Smallholder Livestock Keeping

(1) ANIMAL NUTRITION	Objectives	Dry season nutrition	Mineral supply
<b>Low-input and diversified smallholder systems</b>	Reduced mortality in dry season Reduced weight-loss Increased resistance to drought	Agricultural left-overs storage and feeding Support local feeding innovations Plant leguminous trees Improved use of kitchen left-overs Green forage Hay making Cheap by-products Feeder troughs	Provide ordinary salt Home-made mineral blocks Vitamins
Recommendations for improvement			
<b>More specialized smallholder systems</b>	Better nutritional status year-round Improved reproduction rate Special feeding young stock	Local production of balanced feed Improved straw feeding Hay/silage making	Complete mineral supplements Vitamins
Recommendations for improvement			

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(2) PASTURE AND RANGELANDS	<i>Objectives</i>	Pasture	Rangeland
<b><i>Low-input and diversified smallholder systems</i></b>	Reduced overgrazing and soil-erosion Reduced bush encroachment Increased carrying capacity Increased resistance against drought Community organization		
Recommendations for improvement		Controlled grazing Zero-grazing system	Reviving communal grazing control Fencing off grazing areas Rotational grazing Special grazing areas for dry period Controlled and prescribed fire
<b><i>More specialized smallholder systems</i></b>	Sufficient fodder available year round Good quality fodder Good N and P efficiency Increase soil fertility and soil life		
Recommendations for improvement		Plant fodder crops Pasture rotation Special pastures for young stock Zero-grazing system Efficient fertilization of pastures	Effective weed control
(3) WATER	<i>Objectives</i>	Access to water	Water quality
<b><i>Low-input and diversified smallholder systems</i></b>	Regular water uptake Water quality sufficient Pollution of human water sources prevented		
Recommendations for improvement		Water 1–2 times a day Opt for animal species that require little water	Prevent polluted drinking water for animals Prevent pollution of water for human use by animals
<b><i>More specialized smallholder systems</i></b>	Good water availability and year round quality		
Recommendations for improvement		Continuous access or provide access 3–4 times a day	Prevent pollution of drinking water by chemicals or artificial fertilizers

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(4) INFECTIOUS DISEASES			
	<i>Objectives</i>	Animal health services	Vaccination
<b><i>Low-input and diversified smallholder systems</i></b>	Reduced incidence zoonosis Reduced animal mortality due to infectious disease Promote synergy between traditional and modern remedies Improved access to local animal health services		
Recommendations for improvement		Support ethno-vet practices and practitioners Train Community Animal Health workers (CAHW) Awareness about zoonosis	Vaccination of one or two against major infectious diseases
<b><i>More specialized smallholder systems</i></b>	Improved use of ethno-vet medicine (medicinal plants) Improved use of commercial medicine One health: human and animal medicine join forces		
Recommendations for improvement		Ethno-vet practices strengthened Training improved use of commercial medicine Disease surveillance Monitoring and recording of disease incidence	Extended vaccination programmes
(5) PARASITE CONTROL			
	<i>Objectives</i>	Internal parasites	External parasites
<b><i>Low-input and diversified smallholder systems</i></b>	Reduced incidence of internal and external parasites Prevention parasitic zoonosis Reduced loss young stock due to parasites Improved leather quality		

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(5) PARASITE CONTROL	<i>Objectives</i>	Internal parasites	External parasites
Recommendations for improvement		Make use of natural resistance of local breeds Reducing parasite incidence in grazing and feeding areas Parasite control especially in young stock Support ethno vet remedies for parasite control	Make use of natural resistance of local breeds Use of medicinal plants for parasite control (ethno vet) Community control activities (bathing)
<b>More specialized smallholder systems</b>	Low incidence of internal and external parasites in all stock Special care for young stock (especially exotics and crossbreeds) Prevent resistance against commercial medication		
Recommendations for improvement		Regular treatment all stock Medicinal plants and commercial medications	Regular bathing/spraying of all stock Medicinal plants and commercial medications
(6) BREEDING	<i>Objectives</i>	Use of breeds	Breeding management
<b>Low-input and diversified smallholder systems</b>	Maintain important local breeds Make use of important traits of local breeds Effective selection Prevent inbreeding		
Recommendations for improvement		Breeding selection on basis of local criteria Bring in improved local breeds	Prevent inbreeding Timely castration Change males before mating with own offspring
<b>More specialized smallholder systems</b>	Increased productivity Effective selection Selective use of exotics Good reproductions rates Maintain local breeds for crossbreeding		

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(7) PROTECTION AND HOUSING	<i>Objectives</i>	Predators, accidents and theft prevention	Weather protection
Recommendations for improvement	<p>Reduced loss due to predators, theft and trampling</p> <p>Effective low-cost constructions with local materials</p> <p>Prevent transmission of zoonotic parasites</p>	<p>Improved local breeds</p> <p>Crossbreeding between 25–75% of exotic blood</p> <p>Selection of bulls</p> <p>Selective/limited use of artificial insemination</p>	<p>Breeding only at minimum age and height</p> <p>Strict control of uterus infection</p> <p>Effective heat detection (in case of AI)</p>
<b><i>Low-input and diversified smallholder systems</i></b>			
Recommendations for improvement	<p>Effective housing with enough space for each animal</p> <p>Clean housing</p> <p>Manure available for crops</p>	<p>Protection of young animals during first weeks</p> <p>Protection during brooding and caring for young</p> <p>Night shelters</p> <p>No contact between animals and human stool</p>	<p>Provide simple night shelters</p> <p>Trees for shade in fields</p>
<b><i>More specialized smallholder systems</i></b>			
Recommendations for improvement		<p>Milking shed</p> <p>Ventilation</p> <p>Manure-pit</p>	<p>Housing for zero-grazing</p>
(8) SPECIAL CARE	<i>Objectives</i>	Sick animals	Around delivery
<b><i>Low-input and diversified smallholder systems</i></b>	<p>Increased survival rate of sick animals</p> <p>Reduced mortality of newly born</p> <p>Reduced disease female animals after birth</p> <p>Good bonding</p> <p>Reduced disease transmission around birth</p>		

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(8) SPECIAL CARE	<i>Objectives</i>	Sick animals	Around delivery
Recommendations for improvement	<p>Effective control of high-productivity problems Young stock in good condition</p>	<p>Separate sick from healthy animals Shade, water, fresh food Ethno vet treatment Disposal of dead animals</p>	<p>Have animal near before birth Attend birth when necessary Check afterbirth Guarantee colostrum intake</p>
Recommendations for improvement		<p>Special care of young stock Regular mastitis control</p>	<p>Support to difficult birth due to large fetus</p>
More specialized systems		<p>Ethno vet/commercial treatment</p>	<p>Milk fever control</p>
(9) IMPROVED MARKETING	<i>Objectives</i>	Informal Markets	Formal – regional markets
<b>Low-input and diversified smallholder systems</b>	<p>To supply family and local community requirements for food and household needs To fully utilize local resources</p>	<p>Barter and other forms of exchange Sale at the doorstep</p>	<p>Develop niche markets of local breeds</p>
Recommendations for improvement	<p>To maximize production volume, uniform quality To meet consumer desires</p>	<p>Support local innovation in production, storage and marketing Improve product quality and volume Develop niche markets Improved organization</p>	<p>Improve product quality and volume Improve communication about market opportunities</p>
Recommendations for improvement		<p>Improve product quality and volume Develop niche markets for organic or environmentally sound products Develop sell and buy cooperatives that provide uniform delivery through high and low seasons</p>	