

## **Pro-Poor Livestock Policy Initiative**

Livestock Sector Policies and Programmes in Developing Countries A Menu for Practitioners

A Living from Livestock



Pro-Poor Livestock Policy Initiative A Living from Livestock

### Livestock Sector Policies and Programmes in Developing Countries A Menu for Practitioners

Ugo Pica-Ciamarra Joachim Otte Chiara Martini Recommended ci a ion

**FAO.** 2010.  $\mathcal{L}_{i}^{k}$  e c ec i *licie a d i g/a e i de e<sup>l</sup> i g c u rie : a e u f i rac <i>i i er*, by U. Pica-Ciamarra, J. Otte and C. Martini. Rome, pp. 150

The designations employed and the presentations of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or its authorities or concerning the delimitations of its frontiers or boundaries. The opinions expressed are solely those of the author and do not constitute in any way the official position of the FAO.

ISBN 978-92-5-106543-3

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fullyacknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to: Chief

Publishing Policy and Support Branch Office of Knowledge, Research and Extension FAO Viale delle Terme di Caracalla, 00153 Rome, Italy or by e-mail to: copyright@fao.org

## Con en

Tables and boxes	V
Preface	vii
Acknowledgements	ix
Abbreviations and acronyms	Х
1. PRO-POOR LIVESTOCK SECTOR POLICIES AND PROGRAMMES	1
1.1. Ra ionale for he Li e ock Polic Men	1
1.2. Foc and r c re of he Li e ock Sec or Polic Men	3
2. MANAGING THE BASICS OF LIVESTOCK PRODUCTION	7
2.1. Land policie and programme	7
2.1.1. State-led land reallocation	9
2.1.2. Market-driven land reform	10
2.1.3. Regulation of land rental markets	12
2.1.4. Land titling	15
2.1.5. Recognition of customary land tenure	16
2.1.6. Land co-management	18
2.2. Ri k-coping policie and programme	20
2.2.1. Livestock insurance	22
2.2.2. Early warning systems	25
2.2.3. Contingency plans	26
2.2.4. Emergency feeding	28
2.2.5. Grazing reserves	30
2.2.6. De-stocking	32
2.2.7. Re-stocking	34
3. ENHANCING LIVESTOCK PRODUCTIVITY	37
3.1. Animal heal h er ice and e erinar pplie : policie and programme	37
3.1.1. Decentralization	39
3.1.2. Cost recovery of animal health services	42
3.1.3. Joint human-animal health systems	44
3.1.4. Subcontracting	45
3.1.5. 'Smart subsidies' to private service providers	48
3.1.6. Community animal health workers	49
3.1.7. Membership-based organizations	51
3.1.8. 'Smart subsidies' to livestock farmers	53

3.2. Li e ock-rela ed financial policie and programme	55
3.2.1. Portfolio diversification and flexibility	57
3.2.2. Livestock as collateral for loans	59
3.2.3. Warehouse receipt systems	61
3.2.4. Mobile banking	63
3.2.5. Branchless banking	65
3.2.6. Member-based financial institutions	67
3.2.7. Credit bureaus and scoring	69
3.3. Marke ing policie and programme	71
3.3.1. Livestock trader associations	73
	65

## Table and bo e

### TABLES

Structure of the Livestock Sector Policy Menu	6
Land policy and programme options	8
Risk-coping policy and programme options	22
Animal health policy and programme options	39
Rural finance policies and programme options	57
Livestock marketing policy and programme options	72
Trade policy and programme options	88
Policy and programme options for livestock research	106
Livestock-environment policy and programme options	119
	Structure of the Livestock Sector Policy Menu Land policy and programme options Risk-coping policy and programme options Animal health policy and programme options Rural finance policies and programme options Livestock marketing policy and programme options Trade policy and programme options Policy and programme options for livestock research Livestock-environment policy and programme options

#### BOXES

Во	1.	Policies and programmes	2
Во	2.	State-led land redistribution in Japan	10
Во	3.	Market-driven land reform in Colombia	12
Во	4.	Regulation of rental markets in West Bengal, India	14
Во	5.	Land titling programme in Cameroon	16
Во	6.	Recognition of customary land tenure in Botswana	18
Во	7.	Land co-management in northern Burkina Faso	20
Во	8.	Livestock insurance in Mongolia	24
Во	9.	Drought early warning system in Turkana District, Kenya	26
Во	10.	Drought contingency planning in Rajasthan, India	28
Во	11.	Feeding programmes during droughts in North Africa	30
Во	12.	Fodder banks in Nigeria	32
Во	13.	De-stocking in Narok District, Kenya	34
Во	14.	Livestock re-stocking in Bosnia and Herzegovina	36
Во	15.	Decentralization of veterinary services in Uganda	40
Во	16.	Cost recovery for cattle dipping in Zimbabwe	43
Во	17.	Joint animal-human health services in Chad	45
Во	18.	Subcontracting animal extension services in Mali	47
Во	19.	Agriclinics and agribusiness centres in India	49
Во	20.	Community-based animal health workers in Sulawesi, Indonesia	51
Во	21.	Membership organizations in Gujarat, India	53
Во	22.	Input vouchers to Romanian farmers	55
Во	23.	Caja Los Andes in Bolivia	59
Во	24.	Cattle as collateral for loans in Uruguay and the state of Kansas	61
Во	25.	Warehouse receipt system in Zambia	63
Во	26.	Mobile banks in Malawi	65

-	

Во	27.	Banking correspondents in Brazil	67
Во	28.	Village banks in Mali	69
Во	29.	Credit bureaus in Peru	71
Во	30.	Uganda's National Dairy Traders' Association	74
Во	31.	Livestock brokers in the Sudan	76
Во	32.	Samburu livestock market in Kenya	78
Во	33.	Milk marketing associations in Armenia	80
Во	34.	Pro-poor contract poultry farming in Malaysia	82
Во	35.	Livestock marketing information system in the United Republic of Tanzania	84
Во	36.	Zambia agricultural commodity exchange	86
Во	37.	Pigmeat export subsidies in the European Union	89
Во	38.	Pork import tariffs in China	91
Во	39.	Beef export ban in Argentina	93
Во	40.	International sanitary and phytosanitary standards on BSE	95
Во	41.	FMD disease-free zone in Botswana	97
Во	42.	A model export system for de-boned beef	99
Во	43.	Djibouti Livestock Export Facility	101
Во	44.	Quarantine facilities in Malaysia	103
Во	45.	Decentralization of agricultural research in Mali	108
Во	46.	Matching research grants in Malaysia	110
Во	47.	Beef cattle commodity levies in Canada	112
Во	48.	Competitive research funds in Eastern and Central Africa	114
Во	49.	Livestock breeds in Hungary's patent law	116
Во	50.	Participatory goat research in India	118
Во	51.	Controlled grazing in Senegal	121
Во	52.	Co-management of grazing land in Kenya	123
Во	53.	Siting livestock in Wisconsin	125
Во	54.	Manure production rights in the Netherlands	127
Во	55.	A silvopastoral PES system in Nicaragua	129
Во	56.	Biogas processing for small-scale farmers in China	131
Во	57.	Grazing tax in southern Mali	133

### Preface

Interventions aimed at strengthening the livestock sector in the developing world are relevant for reducing poverty and hunger as hundreds of millions of rural households rely heavily on livestock for sustaining their livelihoods. Farm animals generate opportunities for on- and off-farm employment and provide an important supplement to the cereal-based diets of the less well-to-do. At the same time, demographic growth and gains in real per caput income are drivers of increased demand for animal-source foods, particularly in rapidly growing, often densely populated developing countries.

The livestock sector's potential for reducing poverty and enhancing food security has been under-exploited as the the sector has long been treated as an appendage only to agriculture, with both policy-makers and development practitioners giving priority to staple crops over high-value agricultural products such as fruits, vegetables and animal-source foods. In addition, livestock sector interventions have been mostly of a technical nature, focusing on the elements of animal husbandry, feeding/nutrition and disease control. While important, these interventions tended to disregard the broader policy and institutional framework within which farmers operate. In other words, the range of incentives and disincentives that underpin household production and consumption decisions have thus been overlooked. In addition, when on rare occasions adequate attention has been paid to policy and institutional dimensions, livestock sector policies/programmes have been designed by technical staff in livestock departments, NGOs or international organizations with little consultation with other ministries, and limited appreciation of and connection with the 'non-livestock' policies and markets critical for livestock sector development.

The Livestock Sector Policy Menu presented in this volume (hereafter, the Menu) has been prepared by the Pro-Poor Livestock Policy Initiative (PPLPI), funded by the Department for International Development (United Kingdom) and launched by FAO in 2001 with the objective to enhance the capacity of FAO and its Member States to formulate and implement policy and institutional changes in the livestock sector to the benefit of the poor. The Menu comprises a user-friendly, non-technical compilation of livestock sector policies/ programmes, including case studies, to assist policy-makers and development practitioners in formulating and implementing plans for institutional reforms and livestock sector-related policies that will benefit livestock farmers in particular and, in general, all stakeholders along the value chain. The Menu views the livestock sector in the broader context of agriculture, and provides some 60 examples of policies and programmes from a variety of domains, including land tenure, insurance, animal health service provision, credit, marketing, trade, environment and research, all of which have a vital role in promoting the rapid, inclusive growth of the sector.

The Menu is innovative in some respects. First, many of the policies and programmes identified draw on market-based instruments that rely on public-private partnerships. Public institutions dealing with the livestock sector may promote such partnerships, both within

the sector and in non-livestock-specific domains, thereby tapping into the entrepreneurial capacity of rural households to promote the development of livestock and livestock-related markets. This is particularly important when livestock ministries face strict monetary policies and budgetary restrictions. Second, by showing that any policy objective can be served by a variety of complementary or alternative public actionshleme7inati oe5(comple)be n1budmple

Same Ing:

## Ackno ledgemen

The present Livestock Sector Policy Menu was prepared by a core team composed of Chiara Martini, Joachim Otte and Ugo Pica-Ciamarra (team leader). Messrs Otte and Pica-Ciamarra are staff members of the Animal Production and Health Division of the Food and Agriculture Organization of the United Nations (FAO), whereas Ms Martini is at the University of Roma III.

In preparing the Menu both official and grey literature were drawn upon, as well as field work, working papers and research reports prepared under the FAO Pro-Poor Livestock Policy Initiative (PPLPI), funded by the Department for International Development of the United Kingdom and launched by FAO in 2001. The objective of the PPLPI is to enhance the capacity of FAO and its Member States to formulate and implement policies and institutional changes in the livestock sector, to the benefit of the poor.

Special thanks go to Achilles Costales, Piero Conforti, Adrian Cullis, Mamta Dhawan, Pierre Gerber, Paolo Groppo, Irene Hoffmann, Abdi Jama, Lucy Maarse, Nancy Morgan and David Palmer, who provided valuable, constructive comments on the various chapters of the Menu. We are also grateful to Brenda Thomas and Jane Shaw, who have been very helpful and patient editors, and to Monica Umena for formatting this manuscript.

# Abbre ia ion and acron m

ASARECA	A Association for Strengthening Agricultural Research in Eastern and	
	Central Africa	
ATM	automated teller machine	
BNDA	National Agricultural Development Bank (Mali)	
BSE	bovine spongiform encephalopathy	
CAHW	community animal health worker	
CBPP	contagious bovine pleuropneumonia	
CVECA	self-administered village savings and credit bank (Mali)	
CVGT	village land use management committee (Burkina Faso)	
DAC	Department of Agriculture and Cooperation (India)	
DCS	dairy cooperative society (India)	
DDA	Dairy Development Authority (Uganda)	
DLS	district local services (Indonesia)	
DVS	Department of Veterinary Services (Malaysia)	
DRP	Disaster Response Product (Mongolia)	
EMC	environmental management committee	
ESI	environmental services index	
EU	European Union	
EWS	early warning system	
FAO	Food and Agriculture Organization of the United Nations	
FMD	foot-and-mouth disease	
GDP	gross domestic product	
GPS	global positioning system	
GTZ	German Agency for Technical Cooperation	
HPAI	highly pathogenic avian influenza	
IER	Institute of Rural Economy (Mali)	
IFAD	International Fund for Agricultural Development	
ILCA	International Livestock Centre for Africa	
ILRI	International Livestock Research Institute	
INCORA	National Land Reform Institute (Colombia)	
IPR	intellectual property right	
LGA	Local Government Act (Uganda)	
MAP	Marketing Assistance Project (Armenia)	
MDG	Millennium Development Goals	
M&E	monitoring and evaluation	
MIDP	Marsabit Integrated Development Programme (Kenya)	
MINAS	Mineral Accounting System (the Netherlands)	
MIS	market information system	

МО	membership-based organization
NABARD	National Bank for Agriculture and Rural Development (India)
NGO	non-governmental organization
OIBM	Opportunity International Bank of Malawi
OIE	World Organisation for Animal Health
PES	payment for environmental services
POS	point of sale
PPLPI	FAO Pro-Poor Livestock Policy Initiative
PSB	Burkina Sahel Programme
RAC	regional agricultural chamber (Mali)
R&D	research and development
ROSCAS	rotating savings and credit association
SEDC	Sarawak Economic Development Corporation
SHG	self-help group
SPS	sanitary and phytosanitary srandard
TLMP	Tanzania Livestock Marketing Project
TLU	tropical livestock unit
TRIPS	Trade-Related Aspect of Intellectual Property Rights
UNDATA	Uganda National Dairy Traders' Association
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WTO	World Trade Organization
ZAMACE	Zambia Agriculture Commodities Exchange

1.

unable to satisfy growing local demand for milk and dairy products, as evidenced by sharp increases in import volumes in the majority of such countries (Knips, 2005). A review of 61 (Interim) Poverty Reduction Strategy Papers (PRSPs) concludes that livestock-poverty linkages are by no means appreciated by national policy-makers, as only four PRSPs contained a detailed strategy for livestock sector development in their early versions (Blench *e*  $a'_{...}$ , 2003). Overall, the revision and re-elaboration of prevailing policies/programmes governing livestock sector development appear to be critical for capitalizing on existing opportunities for achieving the MDG objectives in agriculture-based economies.

#### **Bo 1. POLICIES AND PROGRAMMES**

There are a ber fdiffere defiii a d der a dig følicie a dør gra e .2 Plicie are here cidered a a e fg er e aci rie ed ard al q-er ic a d/r cial r r e i a br ad bjec field; he are r - erri rial a d r er ae, i.e. he cera e irec rada i ølace ila e ølicregi ei deiged effec. Liberaliza i fa i al heal h er ice, r le a d reg la i ha all a d 🗸 i accer lie ckac llaeral fria, a de ir e al a e di charge fr ba k li e ck a be er ed e licie. I ead, er gra e are defi ed a ac i a aged b ● blic r ●ria e age , hich are li i ed i i e a d re rce a d i l e direc i eracih ୶ aric lar akeh ldergr 🖌 cha lie ck far er a d fia cial i i . i i Ea ୶ le f ୶ r gra e i cl de he e ablih e f dr gh earl-ar i g e ; di e chage, a d he e-ff di rib i f eablihe fac cher far er • rchaelie ckerice adeeriar •• lie a arke •rice. Pr gra е, hich icl de 'ør jec', are fe ee a Ifriøle e ig a braderølic ad, a ch, h ld becie ih heereailig elic fraerk. I i a ce, 🖌 licie a d 🐢 rie ୶ r gra e r rechage i he a hag er a d ∉riae-ec r e i i i /rgaizai era e.

<sup>&</sup>lt;sup>2</sup> Policy is "a course or principle of action adopted or proposed by a government, party, business, or individual, etc." (OED, 2006). "Policies [...] constitute the means for implementing a vision" (Norton, 2004). Policies are "the methods used by governments to change the environment" wherein economic agents operate (Ellis, 1992). Policy is "a deliberate act of government that in some way alters or influences the society or economy outside the government. This includes, but is not limited to, taxation, regulation, expenditures, and legal requirements and prohibitions" (Deardorff, 2006). Policy is "very much like a decision or a set of decisions, and we 'make', 'implement', or 'carry out' a policy just as we do with decisions. [...]. In some other ways a policy is not like a decision. The term policy usually implies some long-term purpose in a broad subject field. Sometimes, however, we conceive policy not so much as actively purpose oriented but rather as a fairly cohesive set of responses to a problem that has arisen" (Sandford, 1985). A programme is " a planned series of actions" (OED, 2006). "Programmes are defined as only those [actions] that … are delivering a service … and have a well developed plan" (World Bank, 2006). "Programmes are limited in time and resources. They require the active participation of the government (even if the implementation is contracted out to the private sector), and when the funding terminates, the programme ends" (Norton, 2004).

A number of technical manuals deal with specific livestock development issues. These include, for instance, guidelines for epidemiological surveillance in animal health or for the management of transmissible spongiform encephalopathies (Dufour and Hendrikx, 2009; FAO, 2007); the few comprehensive analyses of livestock sector policies/programmes tend to be sector-specific and technical in nature (e.g. Ehui *e* a'., 2003; ILRI, 1995; Jarvis, 1986). Therefore, there are no manuals or guidelines to help policy-makers appreciate the multifaceted dimensions of the livestock sector or to elaborate approaches to formulating policies/programmes taking account of the economic/institutional context in which livestock farmers arrive at their production and consumption decisions.

The Menu presents a number of practical guidelines and examples to assist policymakers and development practitioners to (i) view the livestock sector from a broad socioeconomic and institutional perspective, and (ii) formulate effective sector policies and programmes that take account of the economic and institutional context in which livestock producers operate.

#### **1.2. FOCUS AND STRUCTURE OF THE LIVESTOCK SECTOR POLICY MENU**

Focus has been placed here on direct links between livestock sector development and poverty reduction. These links mainly involve increased production and productivity of livestock producers: a precondition for second-round poverty reduction effects such as employment generation along the supply chain and greater availability of affordably priced animalsource foods. In particular, the Menu:

- reviews and details a key selection of policies and programmes that (aim to) enhance the efficiency and equity of livestock production systems;
- looks both at livestock sector policies/programmes and at public actions in related and cross-cutting sectors – such as credit and environmental policies/programmes – that are critical to ensuring efficient and equitable livestock sector growth.<sup>3</sup>

Efficiency and equity are standard rationales for government interventions in markets (Stern, 1991; Stiglitz, 1989). They also justify policies and programmes in livestock and livestock-related markets:

• Some livestock-related goods and services, such as disease control and prevention, are public goods with the attributes of non-rivalry (can be used jointly by many) and non-excludability (those not paying for the goods also benefit). These goods and services, therefore, are not supplied by the private sector. For instance, no individual farmer will control tsetse flies on open rangelands because the benefits thereby generated will extend to the whole grazier community free of charge. For the supply of public goods, therefore, someone must take charge of organizing collective action. This can be done at various levels, from voluntary cooperation in local communities to compulsory actions legislated by central government in the event such goods, such as for the control of zoonotic diseases, benefit a large proportion of the population.

<sup>&</sup>lt;sup>3</sup> Economic growth is efficient when scarce resources are allocated to maximize the production of goods and services; it is equitable when it maximizes the benefits to society, which depends both on the quantity and distribution of the goods and services produced among the population.

• The lack of, and asymmetries in, information on many livestock and livestock-related markets may go against the interests of livestock producers. For instance, financial institutions have limited information on farmers' capacity to make remunerative

animal breeds and the quality/coverage of animal health services, may have little chance of success unless farmers also have access to feed, labour, water and other inputs, as well as to output markets. What are the incentives for livestock keepers to keep high-quality livestock breeds if they have limited access to the feed necessary to raise them? Who will they sell their surplus meat or milk to if they lack access to remunerative markets?

A comprehensive livestock sector policy agenda should view livestock farming from a broader perspective, and take account of the multiplicity of elements necessary to sustain the sector's development. Such an agenda could be subsumed into three major components aimed at assisting farmers in: (i) managing the basics of livestock production; (ii) enhancing livestock productivity and competitiveness; and (iii) sustaining livestock productivity and competitiveness; and (iii) sustaining livestock productivity and competitiveness.

- Policies/programmes to assist farmers in 'managing the basics of livestock production' are public actions that both provide livestock keepers with adequate and secure access to basic production inputs, such as land, feed and water for animals, and help them to cope with risks and shocks such as natural disasters and price swings. While secure access to basic production inputs and to risk-coping mechanisms are preconditions for engaging in production, they are not sufficient for livestock keepers to produce market production surpluses and rise out of poverty.
- Policies/programmes aimed at enhancing livestock productivity include all actions intended to facilitate farmers' access to animal health services, credit and output markets – both national and international – all of which are critical for farmers to generate and market production surpluses and for improving livestock's contribution to household incomes.
- In order to avoid being forced out of the livestock sector, farmers must be able to respond and adapt to changing market conditions and consumer demand. Policies/ programmes that aim to sustain livestock productivity and competitiveness include research, environmental protection and all other public actions necessary to support the sustainability and competitiveness of livestock farmers in the medium to long term.
- For each of these three components, the Menu details a variety of complementary and/or alternative livestock-related interventions, including land, risk-coping, animal health, credit, marketing, trade, research, and environment policies/programmes. The Menu describes the rationale of each policy/programme; reviews the role of the public and private sectors in their formulation and implementation; identifies major implementation issues; and presents a country case study. Table 1 lists the policies and programmes presented in the Menu.

De elopmen domain			
Managing he ba ic	Enhancing lie ock prod cii	S aining lie ock prod cii	
La d 🗭 licie & ศ r gra e	A i al heal h ∉ licie & ∉r gra e	Re earch ≠ licie & ≠r gra e	
S a e-led la d reall ca i	Dece raliza i	Dece raliza i	
Marke -dri e la dref r	C -rec er faialhealh	Ma chi g re earch gra	
Reglai fladre al arke		Le -f ded re earch	
La dilig	S bc racig	C eiiereearchf d	
Recgii fcarlad ere	'S ar bidie' ∉riaeerice	Sregheigiellecal ør øer righ	
Ladc-aagee	∳r ider C i a i alhealh rker	Parici∳a r li e ckreearch	
	Me ber hiø-ba ed rga iza i		
	'Sar bidie' lie ck farer		
Rik-c ≠ig ≠ licie & ≠r gra e	Credi ୶ licie & ୶ gra e	E ir e al∳licie &∳rgra e	
Lie cki race	Prfli dierificai ad	C r lled grazi g	
Earlarige Cigecela	Lie ckac llaeral fria	C-aageefc ¢rare	
E erge c feedi g	Wareh e recei <del>¢</del> e	Lie ckzig	
Grazi g re er e	M bile ba ki g	Di charge 🧯 a	
De- cki g	Bra chle ba ki g	Pa e freir e alerice	
Re- cki g	Me ber-ba ed fi a cial i i	Markeig feirealg d	
	Credibrea adcrig	Eirealae	
	Marke i g ø licie & ør gra e		
	Lie ckradera ciai		
	age		
	Peri dic arke		
	Marke - rie ed far er a cia i		
	C rac far ig		
	Marke Ifraie		
	C di e cha ge		
	Trade ୶ licie & ୶r gra e		
	Eørøøreare		
	l∳rrerici eare		
	E¢rrerici eare		
	Saiar ad,∳h aiar adard		
	Di ea e-free e 🖸 r z e		
	C di -ba ed rade		
	Trade-e ha ci g i fra r c ral i e e		
	Qara ieze		

#### Table 1: STRUCTURE OF THE LIVESTOCK SECTOR POLICY MENU

## 2. Managing he ba ic of li e ock prod c ion

If livestock keepers are to engage in production activities, they must have adequate access to land, water and feed (and, of course, livestock). At the same time, if they are excessively vulnerable to risks (e.g. drought) that affect their assets and returns, they may follow a conservative production strategy (e.g. be slow to adopt technology) and respond poorly to market opportunities and public policies. Governments must therefore:

- (a) ensure that livestock farmers have access to land, water and feed for their animals (land policies);
- (b) ensure that livestock farmers have access to mechanisms to cope with natural disasters and price shocks (risk-coping policies).

#### 2.1. LAND POLICIES AND PROGRAMMES

Secure access to production land and water is critical to livestock farmers. Animals are fed with crop residues and stubble in mixed crop-livestock production systems, and with grass and shrubs on rangelands. Land availability does not have a significant effect on production/productivity in intensive industrial production systems and peri-urban areas, because the livestock are mainly given compound feed.

Farmers and pastoralists may have access to land and water under diverse and complex tenure systems (FAO, 2002a; 2002b; World Bank, 2003):

- Private property rights: the land (water point) is assigned to an individual, household or corporate body with exclusive rights to make (or not make) productive use of, mortgage, sell, subdivide and lease the land for any lawful purpose.
- State property rights: the land (water point) is assigned to a public-sector authority. The state may manage the land directly, or grant or rent it to a community or household.
- Communal property rights: the land (water point) is assigned to a community, the members of which have the right to use, and/or exclude others from using it. Common land is often held in customary regimes and managed under traditional practices.
- Open access: land (water) rights are not assigned exclusively and no one may be excluded from using the resource. Examples here include marine tenure, where access to the high seas is generally open to all, and some rangelands and forests.

Most land tenure systems are present in all countries, including common grazing rights and water reserves, private agricultural holdings and state ownership of forests. *A .i .i*, no system is superior to another in terms of its contribution to agricultural/livestock production and social welfare, excluding the open-access land tenure systems often associated with resource overexploitation. Indeed, it is not the system of land tenure that matters so much as the adequacy and security of tenure that allow for efficient and sustainable use of resources. Adequate access refers to the quantity of land that allows livestock farmers to feed their animals regularly and adequately. There is no optimal ratio between land availability, agricultural production and livestock stock, as this depends on household endowments, agro-



#### 2.1.1. S a e-led land realloca ion

When there is unequal distribution of land rights and the demand for land remains unmet, one option for policy-makers is to launch a government-driven land reallocation programme or agrarian reform. Basically, this means that a central authority forcibly dispossesses large landowners of their land and redistributes it to selected beneficiaries who, either individually or collectively, cultivate it (Ghose, 1983; World Bank, 2003). State-led land redistribution programmes are non-market mechanisms (expropriation) for reallocating resources; they usually target settled farmers and involve:

- identifying the agricultural area to be expropriated and redistributed this will be possible only when an updated, functional land cadastre is available;
- establishing criteria for assessing land values, and drawing up a compensation schedule for landowners; compensation is usually in the form of interest-bearing bonds, with cash seldom exceeding 20 percent of the fixed price of land;
- establishing how much (if any) landowners will be allowed to retain and how much will be granted to each beneficiary household;
- in accordance with established criteria, selecting the beneficiaries who will either receive the land free of charge or will be required to repay it to government (often benefiting from loans on favourable terms);
- establishing an institutional mechanism for reallocating land, setting out responsibilities for identifying land suitable for expropriation, establishing land values, selecting beneficiaries, issuing and distributing land titles, and managing financial outflows/inflows.

State-led land reforms have not always been successful to date. This is because of the following:

 They ultimately change the pattern of wealth distribution in rural areas and thus lead to fierce opposition from landowners, who often boast of being closely connected to government or are themselves the legislators. The few successful programmes have been implemented by governments with no political connections among the rural bourgeoisie, and sufficiently quickly to ensure that large landowners would not be able to set up opposing coalitions and/or find legal or quasi-legal ways of bypassing the programmes.

- The land valuation process and selection of beneficiaries can lead to endless debate and often involve court rulings, which makes for very lengthy programme implementation.
- Large-scale state-led land reforms are costly (expropriation) and difficult, if not impossible, for most developing country governments to finance. However, as such reforms are one-off interventions, they do not call for continuous government spending.
- Beneficiaries are often unable to set up productive farms because, although they
  might have received some productive land, they lack both management expertise and
  access to other productive inputs. Successful agrarian reforms have been carried out
  in countries where an efficient system of extension services was already in place and
  smallholders had access to seeds, fertilizer and other productive inputs.

#### Bo 2. STATE-LED LAND REDISTRIBUTION IN JAPAN

Pri r he Sec dW rldWar, Jara e e far la dere cliaedb 5.5 illi ea a ehld, e hird f hich ere e a cliar (k ak) rkig all, re ed  $\mathbf{a}$ l. h I heafer a h f he ar, he he c r faced ar a i , he G er e i elee edadra icladrefr ୶ gra е redirib e far la da deliia e he e a / large la dl rd e . The la d ref r , carried i 1946-1950, a r c red ar d i e : (i) far la d ed b ab e ee la dl rd a bjec с I r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r 
r С . (ii) e a ed la di e ce f1 ha bel gi g illage la dl rd а bjec • I r С rcha e; (iii) er-cliaedladie ce f 3 ha (12 ha i H kkaid ) bjec а c / l r / rcha e; (i ) / rcha e / rice ere calc la ed b liølig here al al eb a fi ed fac r: () • a e la dl rd ere ade i a i alb d beariga i ere f3.6 øerce a dredee able i hi 30 ear; a d(i) i all cae, he la d a ørcha ed direc l b he G er e ba ed a ela dra ø b illage la d c i ee ih he are al f he refec relado i ee.

The Jaøa e e la drefriee a e f he cce f l rld ide: (i) i a i øleder heg ida ce f he Allied P er, hich erer e ed ig hec ra heie ec i i h la dl rd; (ii) i a i ele e ed raeidl (i 1946-1950); a d (iii) a d had с i i l ed cha ge i agric l ral∉r d c i ech I gie beca e he la d a ra ferred he e a cliar, ih chagig he far r c re. O erall, agric l ral ed, a dhe di ribi fice i hir ral cie a largel e<sup>10</sup> alized. ord ci b

Source: Ka ag e, 1999.

#### 2.1.2. Marke -dri en land reform

Whenever land property rights are unequally distributed and demand for land for production purposes remains unmet, one option for policy-makers is to carry out a market-based, market-driven or negotiated land reform programme that stimulates voluntary land-market transfers based on negotiation between small buyers and large sellers. The role of government is restricted to establishing the necessary framework to trigger exchanges of land property rights (rather than buying and distributing/selling the land directly). Voluntary land transfers, whereby only efficient farmers are willing buyers and only inefficient producers are willing sellers, are expected to increase agricultural productivity. Market-based land reform programmes target settled farmers, bypass pastoralists and do not contemplate the establishment of collective farms (Borras, 2003; Borras  $e^{-a_{1}^{\prime}}$ , 2008; Deininger, 2001). Such programmes call for the following:

- Identifying areas where land property rights are unequally distributed, and where there is a potential market for land (demand and supply). These areas might cover an entire country, but market-based land reform programmes are usually confined to limited regions.
- Providing incentives for large farmers to sell (part of) their land, such as ratifying fiscal laws that make hoarding land for non-production purposes unprofitable, or enforcing a progressive land tax system that favours small rather than large farms.
- Stimulating demand for land by, *i* e: a *ia*, providing financial assistance to selected beneficiaries. In general, beneficiaries are expected to draft a farm development plan with the assistance of local government officers, NGOs and grassroots organizations. They then receive a combination of grants and loans from the public and private sectors to negotiate purchases of land from willing sellers, assisted by community and local government officers.
- Providing start-up funds and technical assistance from the public and private sectors for beneficiaries to set up self-sustainable agricultural farms.

From the late-1990s, market-driven land reform programmes have been implemented in northeastern Brazil and in Colombia and South Africa. In this regard, the main implementation concerns are as follows:

- There is a pressing need for institutional infrastructure to implement market-driven land reform programmes, including strong national and local governments, presence of NGOs and grass-roots organizations in rural areas, and a private sector willing to invest in small farms.
- Public policies that make hoarding of land for non-production purposes unprofitable are often impossible to enforce owing to institutional weaknesses and pervasive patron-client relationships in rural areas.
- The demand for land is typically much greater than any government can afford to support. In addition, the supply is often limited because large landowners are willing to sell only unproductive and/or marginal land.
- It is difficult to quantify the cost of such programmes because the actual price of land is not often known owing to the absence of a land market before their inception.
   Furthermore, grants to buyers must cover both the full market price of the land and the start-up and working capital costs of the initial years' farming; these differ from farm to farm and from farmer to farmer.
- Market-driven land reforms are not necessarily pro-poor. This is because, in order to be qualified as beneficiaries, rural dwellers are required to draw up farm development

plans if they are later to receive funds (also) from private investors. The very poor are often incapable of preparing such plans, although they receive help to do so from NGOs, farmer associations and local government officers.



investments, they prefer to invest in movable assets. One policy instrument to increase land tenure security – and hence agricultural production and productivity – is regulation of the land rental market, namely, the establishment of a legal and judicial system to regulate and enforce tenancy relationships formally (Pica-Ciamarra, 2004; Sadoulet e = a'., 1998; World Bank, 2003). The regulation of land tenancy contracts calls for the following:

- The existence/establishment of an efficient land cadastre that records not only land ownership titles but also land rental contracts.
- The provision of financial and economic incentives for both landlords and tenants to register rental contracts formally. Such incentives may include reduction of paper costs to register contracts, reduced taxes on rented land, etc.
- Unambiguous rules and regulations on the rights and duties of both tenants and landowners, to be included in all rental contracts to ensure that the contracts entered into are fair and just. For instance, contracts should stipulate that tenants will not be evicted during the crop-growing season, thus ensuring that landlords do not unfairly acquire the entire harvest.
- An equitable and affordable judicial system in order for tenants, who are the weaker contracting party, to sue for breaches of contract and question patron-client relationships.

The regulation of rental markets has proved difficult, for a number of reasons:

- Setting up an efficient land cadastre to record land property rights is a daunting task for many developing country governments; recording rental contracts may also be prohibitively demanding.
- The costs of registering contracts are often high, both directly (e.g. paper, fees, bribes) and indirectly (transport, time).
- As tenants are mostly unaware of their rights, they rarely sue landlords: patron-client relationships loom large in rural areas; judicial procedures are intimidating and costly; and the administration of justice is seldom impartial.
- Governments tend to overregulate tenancy arrangements, for example, by fixing rental ceilings and contract duration, etc. The parties involved may be less inclined, therefore, to register contracts and instead look for ways to bypass the law. In some cases, tenancy regulations have prompted landlords to engage in mass evictions of tenants, thereby reducing security of tenure.

#### Bo 4. REGULATION OF RENTAL MARKETS IN WEST BENGAL, INDIA

U der he 1949 C i i , all I dia a e ere e 🛛 🕐 ered eacadi, ele e la d ref r ai eda i ୶ rigbhacce la da decri fe refrfar er. Sice he, be ee he, he ae hae ea ed re ha 80 la dlegila i ac. H e er, a а a e legila re ere c r lled b he la dl rd cla, ref r ha e f e bee øarial a d a e ha e failed chagehelade re e i a ig ifica a er. The here. I 1977, he Sae Ger Sae fWe Begali e e ceø i e la ched he -called Oera i Barga, a 🖝 gra e de ig ed i øle e a de frœagric I ral ha had ere i le erbee e ac ed, i rder er ide ec ri e a c la fe re harecr øøer. U der he e la , ce he ha e regi ered i h he Deøar e fLa d Ree eadal gahe 🐢 la lea 25 øerce f ø are hela dl rd, e øer a e , i heriable e re а are e i led he la d he harecr . T ake he la effecie, he Sae Gere la ched a aie, ell-ø blicized illage- - illage c i ce e a regi er heir c rac : l cal g er e fficial ra elled ca eaig r ral area, e i h harecr øøer, e ølai ed he la , a d ga e he a ee r i. regi er heir c rac he 🖸 . A he a e i e, he Sae Gere i elified 🖝 ced re frregierig e a c c rac, e 🖌 ered illage 🖌 liical rga iza i e re ha la dl rd did i i ida e heir e a , a d e red ha harecr øøer regffer realia i fr la dl rd a d ha c rac di 🗸 e rac did i eri g c ld be ha dled fairl b he j dicial е.

Opera i Barga i c idered be a cce. B 1993, re ha 65 perce fa e ia ed 2.3 illi harecr poper i We Be gal had regiered heir e a c c rac, i h a igifica i por e e i he er fc rac a di crea ed ec ri fe re. Agric lral por d c i i ha i crea ed re rapidl i We Be gal ha i a her I dia a e.

Sources: Ba erjee et al., 2002; Be le a d B rge , 2000.

#### 2.1.4. Land i ling

Farmers seldom have secure access to the land they work owing to the absence of written, registered and legally recognized documents that guarantee access and user rights. Land titling programmes set in train the process of demarcating, adjudicating and registering property rights within a community, thereby providing both security of tenure to (livestock) farmers and investment incentives. As a general rule, land titling programmes target individual/community farmlands and are more to the benefit of settled farmers and agropastoralists than to pastoral populations (Feder and Nishio, 1999; Jacoby and Minten, 2007; Platteau, 2000a). Land titling programmes call for the following:

- Identifying and demarcating land areas for which land property titles are to be issued. This does not necessarily involve the entire agricultural area of a country but may be confined to specific regions/districts.
- Establishing criteria whereby farmers can prove their rights over the land, and procedures for registering it and receiving title thereto. The more simple and inexpensive the procedures are for farmers – who usually have limited financial and human resources – the greater the chances of success.
- Once applications have been received, government should verify and measure land parcels, and ensure that all action is taken to demarcate landholdings legally and physically, such as placing concrete boundaries on plots and issuing property titles.
- Given the complexities of defining and establishing private land property rights, any application for title should be publicized to allow individuals to oppose possible adjudications.

Designing and implementing land titling programmes may be challenging, for a number of reasons:

- In several countries, land is rarely under a single management system; it is therefore difficult to bring the complex bundle of rights attached to a specific land parcel to the adjudication register.
- Titling procedures are often cumbersome and costly, making it difficult for smallholders to obtain title to land. Complex titling procedures may even reduce the security of tenure for some categories of people, such as women, pastoralists and members of minority tribes, who traditionally enjoy subsidiary or derived (usufruct) rights over agricultural land.
- At times, farmers have bought land (title) and been provided with non-grant loans for the purpose. However, often farmers have been unable to repay their loans and title has been withheld.
- Empirical evidence shows that there is a poor correlation between land titling and investments or land yields, or between land titling and access to financial services. This suggests that land titling programmes should be accompanied by other types of public action that will enable them to contribute to increasing agricultural growth and reducing poverty levels.

#### 2.1.5. Recogni ion of c omar land en re

Customary tenure arrangements are characterized by a multiplicity of rights over land by a multiplicity of individuals. These rights are based on overarching ritual and customary rela-



- Recognition of customary tenure rights provided the land is managed by non-political entities composed of community members in consultation with local governments and/or other stakeholders, without issuing land property titles. This approach aims both at recognizing customary land tenure and at integrating community concerns into local development/investment plans.
- Recognition of customary land tenure rights through issuing a property title in the name of a legal entity representing all community members. For this to be feasible, the entity should have a clear objective; there must be unambiguous rules for membership, clear administrative procedures and an effective dispute-settlement mechanism.
- Recognition of customary land tenure rights through issuing individual property titles that provide community members with share rights over the land. Characteristics of the rights attached to each share should be specified (e.g. Can shares be sold? Can be they used as collateral?).

For several reasons, any attempt to recognize customary land tenure rights may well fail. These include:

- difficulties in identifying and defining communal land tenure systems owing to 'fuzzy' boundaries of grazing/common agricultural areas and the presence of a multiplicity of users with different types of access and user rights over the land;
- difficulties in establishing a legal framework that consistently includes the various rights over land, often because dominant Western-style laws and procedures do not clearly represent the intricacies of customary tenure;
- time-consuming, over-complex or poorly conceived procedures, as well as a lack of incentives for the community to gain legal title to land;
- community imperfections may lead to reduced efficiency and equity; for instance, when recognition of customary tenure requires the establishment of a formal entity within the community, some members may retain surplus land for themselves and leave others short of it;
- communities may not necessary benefit much from recognition of community land tenure because, being poor and unskilled, they are unable to improve management practices and/or set up profitable contracts with external public-/private-sector organizations.

#### Bo 6. RECOGNITION OF CUSTOMARY LAND TENURE IN BOTSWANA

A i dee de ce (1966), c ar la de rei B аас f all agric I ral area. The la d a all ca ed a d reall ca ed i acc rda ce i h radi i al chief ai c rac ice hich, bei g ba ed re cial ha ec ic ra i ale, ere iie e i agric I ral la d. I 1968, i h able he ai ficreaig creadlie ckerd ci /erd cii, he Ger e øa ed he Tribal La d Ac . The Ac ide ified a d de arca ed ribal la d a d e r ed re 🧖 ibili frheall cai a derall a age e f ribal la d I calla db ard -• li ical b die c 🕐 ed f e ber elecedad iaedi heflliga er:(i) he ribal chief/ bchief i a ex officio e ber; (ii) e e ber i are i ed b he ribal chief; (iii) e ber are elec ed b he di ric c cil fr а ghec cill r; a d(i) fr e ber are a 🐢 i ed b he Miir fL cal G er e a dLa d. The la db ard ' eri ar d ie are de arca e la dearcel, lea e ear f he la ddirec l hec i a d/r bgr 🕐 ridiid al, clleclea ehldre, regla e i. -c e ber ' acce la d, re l e 🖸 e ial di 🦸 e a d, re i ge eral, i 🧈 leс e g er e 🖸 licie frlad ea døla i g. La dbardare a h rized ell hela da dea areall keerial gahe eifrherigial rree. ed В a a'i e fhe b-Sahara Africa, e i hich ha cer ai l c rib ed i – ead ec ic gr h, b he lack fh a rce, c ୶ led i h 🐢 🔶 la i h, ake i i crea i gl diffic l f r la d b ard gr erf r heir f c i . I 1998, heref re, he G er e dre 🕐 he Na i al Se le e P lic •r e he de el 🖸 e 🛛 fr ralarea b crea i gifra r c rala d arke lik be ee differe r ral e le e , hereb e rig reørdcie ef agric I ral la d.

Sources: Ada et al., 1999; B a a, G er e f, 1998.

#### 2.1.6. Land co-managemen

Conflicts over land often occur when a multiplicity of users claim to have formal/informal access and user rights over the same agricultural/grazing areas – e.g. settled farmers and herders claiming exclusive access to agricultural land in semi-arid areas; and hunters, farmers and pastoralists, who all exercise rights over national parks and game reserves. Under these circumstances, land co-management is emerging as a popular strategy for efficient and sustainable land use without conflicts. The assumption is that some degree of complementarity may exist between the different objectives of various land users, who may therefore establish and enforce win-win rules and regulations for joint land use and management (CEESP, 2002; SA-PPLPP, 2009; WRI, 2005). The public sector is expected to support the process of establishing land comanagement schemes. This involves the following:

- Identifying and demarcating the land area to be co-managed, and acknowledging the different groups of users claiming rights over the resource.
- Establishing a participatory process, perhaps led by a local representative committee, to define the rights and duties of different stakeholder groups. Decentralized govern-

ment agents and local governments may need to be trained to facilitate and supervise participatory processes.

- Since all stakeholders should have an equal voice in the process leading to definition
  of co-management rules, when necessary, government should provide adequate
  training and support to key stakeholders and, in particular, marginalized groups.
- Setting up an institutional and regulatory infrastructure to facilitate both enforcement
  of endogenous co-management rules and interactions with non-resource users. For
  instance, the state may ensure that local co-management rules conform to prevailing environmental laws and that user committees act legally on behalf of the entire
  community.

Land co-management policies and schemes have, however, proved difficult, for a number of reasons:

- Participatory processes involving a variety of stakeholder groups are time-consuming and unpredictable: it is extremely difficult to mediate tensions between individual and collective interests and to achieve consensus on land co-management rules and regulations.
- Even when land co-management rules have the agreement of all stakeholder groups, formal/informal coordination mechanisms often prove to be weak on the ground, particularly when non-financial incentives for users are not sufficiently appreciated (e.g. democracy, pride, sense of ownership).
- Successful land co-management schemes paradoxically generate new tensions and conflicts associated with increased land values, i.e. their long-term sustainability may be at risk.

prevent and contain economic crises. But these types of instruments are not available to livestock policy-makers. The poor are also stricken by relatively small market dynamics such as seasonal meat/milk price fluctuations. Governments are not expected to be directly involved in coping with such fluctuations, which often just indicate the presence of a frictionless, well-functioning market and/or are the results of characteristics/failures of demand and supply patterns (Conforti, 2004). On the other hand, decision-makers in the livestock sector are in a position to help livestock farmers to cope with severe and often unexpected natural shocks.

Natural disasters have a particularly devastating impact on livestock operators: in Morocco, 26 percent of all cattle and 30 percent of the sheep died or were prematurely sold during the 1981-82 drought (Oram, 1998). In 1998, outbreaks of Rift Valley fever were triggered by torrential rain in most of East Africa, including northeastern Kenya, southern Somalia and the United Republic of Tanzania; thousands of livestock were affected and a survey in Garissa District, Kenya, reported losses of about 70 percent of all sheep and goats, and 20-30 percent of the cattle and camels (CDC, 1998). Beyond their direct destructive impact on livestock numbers, natural disasters also indirectly affect the livelihoods of livestock farmers. First of all, livestock farmers take production decisions in order to mitigate the possible negative impacts of natural disasters, including livestock accumulation, regular and opportunistic herd movements depending on rainfall patterns, breed and species diversification, and herd dispersion between community members.<sup>4</sup> These strategies are associated with a loss in production/productivity as they constrain the investment decisions of livestock keepers who may, for instance, refrain from investing in highly productive nondrought-resistant breeds. Second, once livestock farmers sense that a shock is approaching, they typically dispose of their herds and leave themselves with few animals. As a result, they may not be able to take advantage of potential market opportunities in the aftermath of a shock (Hazell, 1999). Finally, both during and in the aftermath of natural disasters, input/ output market prices become variable and unpredictable, making it difficult for livestock farmers to take 'rational' consumption and production decisions. Therefore, if livestock keepers were less vulnerable to natural shocks, there would be both social and efficiency gains.

Because they are poor and lack sufficient resources, poor livestock keepers are unable to cope alone with the detrimental impacts of natural shocks. At the same time, markets (private institutions) are unwilling to provide livestock farmers with either  $e \ a \ e \ or \ e$ 

risk-coping mechanisms. E = a = e, it is rarely profitable for private agents to provide livestock keepers with insurance: (i) natural disasters can be devastating, as they affect widespread areas and most insurers are unable to diversify their portfolios sufficiently to avoid going bankrupt when a shock strikes; (ii) since livestock management is key to mitigating losses from natural disasters, bad managers have more incentive to subscribe an insurance policy, and private insurers rarely have enough information and resources to

<sup>&</sup>lt;sup>4</sup> These traditional risk-coping mechanisms are becoming less and less effective. On the one hand, growing human populations accompanied by more animals reduce the relative abundance of natural resources; on the other hand, the expansion of agriculture from semi-arid into arid areas and a general tendency to establish private property rights over land constrain the mobility of pastoral people.

screen *a .i .i* thousands of small livestock farmers (e.g. 'bad' and 'good' managers) to be sure of issuing insurance policies only to the 'good' ones; and (iii) once livestock keepers acquire an insurance policy, they may well adopt less reliable production technologies or simply move to areas of higher risk. *E* , i.e. after the shock, livestock keepers might have lost most of their herds and, with no savings and/or assets, be unable to participate in most market transactions. In particular, they will be 'rationed' on the credit market and lack the resources to rebuild their herds without subsidies.

In view of the foregoing, there are several rationales for the public sector to help livestock farmers cope with natural disasters. Table 3 gives a number of policy and programme options available to governments/development agencies to mitigate the negative impact of natural disasters on livestock assets.

Prepara ion ex ante
2.2.1 Lie cki race*
2.2.2 Earl arig e *
2.2.3 C ige c #la *
Mi iga ion d ring
2.2.4 E erge c feedi g*
2.2.5 Grazi g re er e *
2.2.6 De- cki g*
Relief ex post
2.2.7 Re- cki g*
*Mahaisla and hia chdesar a /iiria

#### Table 3. RISK-COPING POLICY AND PROGRAMME OPTIONS

#### 2.2.1. Li e ock in rance

Providing livestock farmers with insurance could be one way of effectively protecting them from natural shocks: if a shock strikes, the livestock operators are entitled to be compensated for (part of) the value of the lost animals. However, insurance products in agriculture and livestock have long been considered unfeasible: natural shocks are devastating; insurers are often unable to diversify their portfolios sufficiently; the cost of quantifying losses can be immense; and insurance companies cannot monitor the behaviour of livestock farmers who, once they have an insurance policy, may shift towards riskier (and potentially more profitable) husbandry practices. Therefore, to date, private livestock insurance has rarely been offered to compensate for animal losses or reduced productivity owing to natural disasters, and never at all to herders in traditional pastoral systems. However, recent studies suggest that private entrepreneurs might enter the livestock insurance business provided a number of basic conditions are satisfied and, therefore, that the provision of insurance to livestock farmers should not necessarily be seen as a net cost to the public sector (Hazell and Skees, 2006; Larson e a'., 2004; Skees and Enkh-Amgalan, 2002).

- The private sector could sell livestock insurance policies at market prices, whereas the public sector could provide them on a cost-recovery basis.
- Livestock insurance policies should be affordable, accessible to all, including the poor, and compensate for total income losses to protect both consumption and debt repayment capacity.
- That a shock has occurred should be clear to all contracting parties (yes/no). For instance, insurance contracts may be taken out against specific rainfall outcomes, measured by a given weather station.
- The shock must be causally correlated with an average level of livestock numbers and meat/milk production. This is because it would be difficult/impossible for public/ private insurers regularly to carry out thousands of on-farm inspections to monitor livestock stock/production parameters, particularly when animals are on the move. This would limit farmer mismanagement and reduce incentives to cheat.
- Livestock insurance should be sold/bought before season-specific information about the insured risk becomes available (i.e. deadline for purchase). This would avoid livestock farmers buying an insurance policy only when shocks are anticipated.
- The investment costs involved in developing a private market for livestock insurance should be largely financed by the public sector. These costs involve: research to identify natural events closely correlated with livestock production and income; communication campaigns among livestock farmers to help them appreciate the value of insurance policies; impartial measurement of natural shocks, etc.

A number of constraints may impede the provision of insurance to livestock farmers:

- Transaction costs are high in sparsely populated areas. Therefore, it is seldom advisable for the private sector to enter into a business involving significant monitoring and supervision costs.
- The rural market for insurance may be too small to attract the private sector (few buyers). Also, the public costs of setting up such a system may be much higher than the potential benefits (it might be less costly to provide relief in the aftermath of a shock).
- Insurers may well go bankrupt following a natural disaster, or government budgets may be constrained to unsustainable levels. To hedge against such risks, insurers must be either large enough to diversify regionally/internationally or able to re-insure on the international insurance market.
- An insurance market will only develop when policies are competitive i -a i other formal/informal risk-coping mechanisms. Therefore, both private insurers and governments should recognize the rationale and benefits/costs of traditional risk-management strategies.
<sup>&</sup>lt;sup>5</sup> DN. d is a term referring to a variety of winter conditions that destroys or prevents access to pastures, which results in animals

## 2.2.2. Earl arning em

An early warning system (EWS) is a technique whereby data are collected on a continuous basis to monitor household access to means of subsistence and food, the objective being to provide timely notice when a production/food crisis threatens people's livelihoods and to help the community and government take the most appropriate remedial action. An effective EWS comprises two basic elements: (i) identification and monitoring of risks and their potential impacts; and (ii) capacity to act on early warnings (Boken  $e_a'$ ., 2005; Buchanan-Smith, 2000; Sommer, 1998). Establishing an EWS that targets livestock farmers calls for the following:

- Identifying livestock (stock, species, gender, etc.) held by the community, seasonal trends in herd stock and, in general, recognizing livestock's contribution to household livelihoods.
- Identifying risks facing the community and their causal direct/indirect impacts on livestock assets. For instance, a flood might destroy the herd directly; an approaching drought might increase fodder prices and, indirectly, make it difficult for livestock keepers to feed their animals.
- Collating and analysing two critical sets of indicators that underpin livestock-based livelihoods: (i) environmental indicators, such as meteorological, hydrological and agricultural parameters; and (ii) socio-economic indicators, such as livestock productivity, meat and milk output prices, input prices, animal health status and household income/expenditure. Monitoring only one type of indicators is insufficient to detect approaching shocks: herd liquidation, for instance, may be caused by high market prices rather than by a scarcity of fodder.
- Setting thresholds for indicators, above/below which those at risk should be warned, and mobilizing public/private resources to mitigate the impact of expected shocks.

A number of issues should be considered when designing EWSs for livestock:

- Such systems are relatively well developed for droughts but much less so for floods, outbreaks of animal disease and civil strife, which also affect both the livestock operators and the sector as a whole.
- It is difficult to identify risk indicators that are easy (and at low cost) to monitor, and to set country- or location-specific thresholds reflecting the prevailing socio-economic situation (e.g. How much rain makes a flood? At what level of rainfall is public intervention required?).
- There is often a lack of willingness/capacity to collect sound environmental and, especially, livelihood indicators. (i) Policy-makers are often reluctant to invest in preventive measures, the tangible benefits of which are both uncertain (depending on the occurrence of natural shocks) and difficult to measure (what would be the impact of a drought if there was no EWS in place?). (ii) Livelihood indicators should be gathered at the local level, but few countries can afford to set up a decentralized system of continuous data collection. (iii) Communities may be tempted to misreport data in order to obtain more benefits than they are entitled to.
- EWSs have mainly been designed to satisfy the needs of international donors that provide massive support when serious disasters occur. Therefore, swift and effective

responses tend to depend largely on the donor community, with reduced incentives for national governments to invest in EWSs. However, EWSs established to serve the information needs of national/local authorities and communities could well contribute to responding to natural shocks.

#### Bo 9. DROUGHT EARLY WARNING SYSTEM IN TURKANA DISTRICT, KENYA

Lie cki hebackb e fKe a'Trka a Diric. The Trka a EWS a de el red he bai fle lear ed fll i g he de a a i g dr gh f he earl 1980 ha ca ed h gel e flie ck. The e ha hree ai bjecie, i.e. :(i) ∉r ideearl ar igifrai ab e fdr gh;(ii) ∉r idei frai he he a ailabili f f da hedr gh ge earer; a d (iii) b ild 🗭 a reliable da aba e fba eli e i fr ai freilcaldeel 🖊 e 🖊 la igadiere i . The Trkaa EWS cllecad ir red,adcaer redejaji /abr alale fra alf18cliajc.ec ic a d elfare i dica r ha i, rai fall le el; 🧌 ali f 🐢 a re; a i al bir h ra e; arke • i f ea, ilk a d cereal, e c. erice ; h eh ld c ha are ed ∿a if he ene e ar f daidre ired ere e /c ai der rih e . The øar ic lar feare fhe Trka a EWS are ha: (i) i i ci - a d di ric-f ced all fr efficie clleci a di rig fredi i dicar; (ii) i gie i ୶ le e age ● lic - aker a hece ralleel, h re ai re ● ible fre erge c i ere i . The eagec i fa e<sup>u</sup>ecef'arig a e', fr 'ral'( alflc a i alflcai), 'alar'(Icalec i i dica r ), 'aler'( affec ed b al flcai), 'e ergec' (allidicar flcae ide heir r alra ge fa i e hrea); a d (iii) he EWS e age are direc l li ked a ber f 🔹 blic re 🐢 e i ere i

F II ig heea «le fTrkaa, a here diric i Ke ahaedeel «ed heir EWS.H eer, herea heEWS i Trkaa a beeffeciei cllecige ir e aladlielih didicar:(i) here i illa ece iela «ei i ebe ee daa clleci /a al i adre «rig ce ralg er e;(ii) de «iedaaclleci, a al i addie i ai i ligdiffere acra hel calle el, eerge ciere i are ill er ce ralized (hediric «ride ifrai ce ralg er e b ca a ici «aei re »); ad (iii) re «ei ere i are illd r-de «e de adf d e d arrielae, I cedr gh hae ared eri I affech eh Idlielih d.

Sources: B cha a -S i h, 2000; USAID et al., 2001.

#### 2.2.3. Con ingenc plan

A contingency plan is the  $e^{-a}$  e preparation of a series of actions aimed at: (i) mitigating the impact of natural shocks on production systems and livelihoods; (ii) providing relief to people rendered destitute by shocks; and (iii) promoting rehabilitation of production systems following shocks. Contingency plans are usually multisectoral; can be developed at the local, national and supra-national levels; and include a variety of interventions such as agricultural loans, energy support facilities, marketing assistance, infrastructure rehabilitation and food-for-work programmes. To be effective, they should build on effective EWSs (Barton  $e_a_{l.}^{l.}$ , 2001; FAO, 1999; Samra, 2004). Contingency plans are based on the following elements:

- Up-to-date information indicating whether a shock affecting livestock is likely to occur, such as that provided by a functional EWS, and adequate knowledge of household risk-coping mechanisms.
- Plans for specific mitigation, relief and rehabilitation measures that support/complement household risk-coping strategies. These measures include, for example, storage of feed reserves, establishment and maintenance of fodder shrubs; emergency movements of livestock to green pastures and water points; prevention and control of animal disease; establishment of ad hoc slaughtering and marketing facilities; provision of credit/heifers for herd reconstitution; and safety-net supplies of food and medical aid.
- An institutional structure capable of collecting, processing and disseminating information, managing plan implementation across line ministries, negotiating with donors at an early stage (before the shock strikes), and, in the event an expected shock does not after all materialize, making alternative (and efficient) use of the resources obtained.

Contingency plans, including those targeting livestock systems, may be of limited effectiveness. This is because of the following:

- Lack of an adequate EWS and poor knowledge of livestock's role in household economies makes it impossible to formulate accurate/effective livestock contingency plans.
- Contingency plans tend to prioritize the distribution of food (and water) to persons and rarely to support the maintenance of physical assets/production systems. Yet an exclusive focus on relief activities has proved inappropriate: laying the groundwork for rehabilitation and development while implementing emergency work is both necessary and reasonable.
- The effectiveness of livestock contingency plans depends on the interventions of a variety of government ministries/departments, often calling for complex institutional cooperation and coordination.
- Several developing countries lack storage facilities for large quantities of animal feed, drugs and vaccines. This may lead to delayed, or even useless, interventions in the aftermath of a shock.
- Contingency plans have a specific livestock component in only a few countries because livestock play a marginal role in most economies. However, livestock are extremely important during the rehabilitation phase following a shock as animals provide outputs on a continuous basis (e.g. milk) whereas harvests are available only two or three times a year. Emergency food should be provided during interim periods.

# 2.2.4. Emergenc feeding

Natural shocks often reduce feed availability and induce livestock keepers to dispose of a large proportion of their herds. If most or all animals are disposed of, however, rural

- An information system providing up-to-date information on animal stocks, livestock
  movements and fodder availability throughout the seasons. This type of system is
  needed in order clearly to identify periods of scarce feed availability and for quantifying the feed to be provided on an emergency basis.
- Selecting livestock farmers entitled to receive emergency feed, which is the major cost component of the programme (e.g. Does the programme target all livestock or just heifers? Are small and large livestock operators entitled to the same quantity of feed per cattle head?).
- Building up and maintaining feed depots during normal periods, either directly or through subcontracting the private sector, and/or establishing contracts with feed importers from other countries, including public and private actors, to ensure adequate supplies of feed once the shock strikes.
- Establishing whether emergency feed is to be distributed free of charge or whether to charge livestock farmers for it (e.g. standard market price; subsidized price).
- Setting up a feed distribution system, including distribution points in strategic areas, which can be managed either by government itself or by subcontracted private agents (e.g. local wholesalers and retailers); and appropriate screening mechanisms to ensure that the feed is distributed only to eligible beneficiaries.

The following are some of the issues associated with emergency feeding programmes:

- Emergency feeding programmes are mainly carried out by NGOs on a small scale. There are few examples of successful countrywide programmes, although they are needed to mitigate the effects of large-scale natural shocks.
- Information available on livestock numbers and feed requirements during periods of shocks should not be considered reliable. Moreover, storing feed is costly and technically demanding, particularly in tropical countries.
- The common tendency is to import feed rather than storing stocks of it. However, importing large quantities of feed can be extremely expensive; it may not be suitable for local animals; and local herders may not know how to handle concentrate feed.
- Feed distribution systems are costly to establish, particularly in remote areas, and strict targeting criteria are difficult to enforce. Emergency feed may therefore end up being distributed to fairly developed areas and relatively well-off farmers. It is also possible that some livestock farmers will move their animals for the sole purpose of benefiting from supplementary feed supplies.
- Supplementary feeding programmes may artificially maintain livestock stocks above their optimal levels, which may lead to unsustainable livestock/grassland ratios and contribute to environmental degradation.
- If supplementary feed is expected to become available as soon as a crisis strikes, livestock farmers may be less inclined to use traditional, albeit more costly and timeconsuming, risk-coping mechanisms such as the use of pastures in remote areas.

#### Bo 11. FEEDING PROGRAMMES DURING DROUGHTS IN NORTH AFRICA

Dr gh reg larl affec Ma hre<sup>4</sup> a d Maghreb c rie. The G er f J rda , e Mrcc, he Sria Arab Ree blicad Tiiahaei ere edi a arie f а li i heir cial a d ec ic da age, i cl di g 🗸 rcha e f c ce ra e feed f r di rib i g er e 🦸 lic i er frialie ck. The c r ide barle, rgh far er a bel aize a d bra arke *e*rice ( hich are a a fe b idized). The erall bid i i e fdr gh ca be a ch a 32 erce i T i ia a d 50 erce i M r cc; feed i 🖝 r reg la i are al rela ed d rig dr gh ear. The e 🖝 gra e hae ør ed cce fli ør eciglie ckad ea/ilkørdci drigie f dr gh.Fre a øle, drig he 1995 dr gh i Mircc, cerealørd ci le el ere 80 ear b he lie ck ec r a barel affec ed; i T i ia, erce I er ha i ere i ber e e i crea ed d rig he dr gh fheearl 1990. Ee h ghhee hee ai ai ed li e ck feedig ୶ r gra e cce f ll ck, a ber f egaie ideeffec ha e bee repred. Fir, arge i g a pride ig ed a d g er e f he ele haig bidize b h he ø rad eal h ørd cer. Sec d, feedigørgra e c rib ed i crea ed ergrazi ga d, a a c e 🖲 e ce, la d degrada i - i Nrh Africa a dhe Near Ea. Third, he e ra egie ୶ eder clie f he large f bidized feed di rib ed. Fi all, g er e ere i cli ed i øle e ch а е ac i bai, regardle f he her r here a a dr gh. er gra Ιi clear he her e erge c feedi g r gra e i N r h Africa ha e bee cce f l he h le. M re er, J rda rece l ab li hed i feed b id ør gra e a d f he errea. he Sria Arab Reø blicha ba ed he cliai fbarle i а Source: Hazell, 1999.

#### 2.2.5. Graking re er e

When natural shocks reduce the availability of feed, governments may help livestock farmers to move their animals to accessible grazing areas. For pastoralists, for instance, this is a longstanding traditional response to drought. But increasing human and livestock populations and expansion of the 'agricultural frontier' are making this strategy less and less effective, and lead to more conflicts between the pastoralists and settled farmers. Public actions are therefore necessary to regulate livestock mobility and allow animals access to select grazing areas, such as government-maintained pastures, national parks, game reserves, and government-owned or private ranches (Bayer and Aters-Bater, 1995; Heath, 2001; Taylor-Powell, 1987). Major steps needed to establish grazing reserves include the following:

- Identification of drought-time grazing zones, which can be either public (national parks/game reserves) or private (ranches). In the latter case, government should facilitate/supervise their establishment and pursue the enforcement of contracts that allow farmers access to private ranches during periods of drought.
- Investments in drought-time grazing areas, including seeding, fencing, watering, etc., so as to ensure feed availability in drought years.
- Definition of rules for access to grazing areas in times of drought: i.e. Which house-



holds are entitled to enter grazing reserves? How many animals – of which species and for how much time – are allowed access to grazing areas? Is access to drought-time grazing areas free, or should livestock farmers be charged a nominal/market fee?

• Where necessary, establishment of trekking routes for moving livestock to grazing areas, including contracts with private ranchers/farmers, feed depots/water points and animal health posts, as well as ad hoc transit procedures (e.g. exemption from transit fees).

Establishing and managing grazing reserves and moving livestock to forage during times of drought is a challenging undertaking, for a number of reasons:

- Growing human and livestock populations increase the social and economic costs involved in setting aside grazing areas: maintaining resources unused in anticipation of an uncertain event would be economically sound only if the gains in times of crisis were larger than production foregone in normal years.
- In times of feed scarcity, there is often greater demand for, than supply of, grazing areas (feed), which are typically insufficient to accommodate all livestock. In the meantime, targeting is complex and livestock farmers are rarely willing/ready to restrict the access to grazing areas of selected animals only, such as heifers and milk cows.
- It is difficult to design and manage massive livestock movements in an efficient manner, one reason being that infrastructural and administrative arrangements discourage movements outside traditional trekking routes.
- Livestock are sometimes taken to environments (e.g. natural parks) where they might be exposed to new diseases that result in higher mortality rates. Conflicts may also break out between drought-time grazing area managers and livestock farmers owing to difficulties in monitoring access to such areas.

# 2.2.6. De- ocking

De-stocking programmes help smallholders to liquidate their herds during droughts, when fodder is scarce and the demand for livestock collapses, and provide direct (e.g. market



grant tax exemptions to livestock traders to buy animals at above market prices from farmers; and establish feed/water points for animals that are trekked to distant markets;

 developing plans for emergency slaughtering and finding ways to sell livestock on national or foreign markets or to store excess meat to avoid disrupting market functioning. The implementing agency may also directly maintain/provide subsidies to large, key operators to maintain the livestock alive.

Implementation of de-stocking programmes is challenging, for a number of reasons:

- At the onset of a drought, when livestock and meat/milk prices are still unaffected, livestock farmers may be unwilling to sell their animals and tend to postpone sales. Sales thus occur when the animals are in poor condition and market prices extremely low.
- De-stocking projects may be prohibitively costly at the onset of a drought, when livestock prices have not yet fallen. On the other hand, if animals are sold late in a drought, supplementary feed will be necessary before slaughtering, and some animals may even die earlier.
- If there is no market for live animals/livestock products and no processing/storage facilities, any de-stocking programme will most likely be unsustainable as none of the costs will be recovered. In addition, farmers participating in de-stocking programmes may sell their animals at below market prices, thereby crowding out non-subsidized producers.
- Traders are often the major beneficiaries of de-stocking programmes. Indeed, implementing agencies find it easier to deal with a few traders rather than with hundreds of livestock farmers. Traders have greater bargaining power during drought as livestock farmers have no other option but to sell their animals.
- There have been few, if any, country-level de-stocking programmes. The scaling up of
  programmes is challenging owing to the lack of reliable terminal markets/processing
  facilities for a large number of livestock and because institutions are generally weak.

#### Bo 13. DE-STOCKING IN NAROK DISTRICT, KENYA

ber f de- cki g ør gra ere i ele e ed i Ke ad rig he dr gh Α e f 1999-2000. I Nar k Di ric, a ør jec f ded b he E r øea C i /C i. De el 🗸 e Tr F dai eda hel∉iqfar er deck 4 erce f he di ric ca le • • lai. The bjecie a : (i) ai he li elih d f 🐢 ral 🐢 🕫; (ii) 🖝 ide f d relief ( ea fr he de- cked herd) de i eh eh ld; a d (iii) red ce e ie al re. The er jec e abli hed 32 lie ck-b i g ce re i ke ra egic area ; 🔹 🔹 rchaigc i ee re 🐢 ible f r ide if i g be eficiar h eh ld; a d hired e ca allab rfr la gherig he a i al. O er a øerid f h, he er jec cceeded i b i q 4 683 ca le f r a al fKh 7 956 705 (ab US\$80 000 i 2000), hich ere i r d ced i he l cal ec . The a i al ere he la ghered a d he ea di rib ed rh ehldad de a eri ar a d ec dar ch l i he affec ed area, i acc rda ce ih arge e ablihed b l calad i i ra i e aff.

The de- cki g er jec cceeded i ai i gheli elih d fe eral ୶ aral h ehld.H eer:(i) hea i al ୶ rchaed ere fe i 🐢 rc dii a door d cedli le a d/ r ℯ r-ゅ ali ea; (ii) l cal c i ee fe 🕐 rcha ed re a i al ha he la gh er i e da a d, beca e f he lack f rage facili ie, ere able e f he ea beca e fifrc ∮i ;(iii) he∮r jec ai ∳le e edfll iga ∳-d an na rach, ih na ralh eh ld na ig an a ier le; a d(i) gie heli ied cale f i er e i , he er jec had a egligible i eac hee ir е.

Source: Aklil a d Weke a, 2001.

#### 2.2.7. Re- ocking

Re-stocking programmes are advocated in the early phases of drought recovery as a way of balancing livestock populations with increased availability of fodder. In recent years, these programmes have been widely promoted by NGOs and governments across Africa as a method of rehabilitating destitute pastoralists who are rarely able to reconstitute their herd in the aftermath of a drought. It is widely felt that re-stocking should keep livestock prices stable after drought; sustain poverty reduction and wealth equalization when animals are given to the most destitute; and, if herders are confident that re-stocking programmes will be implemented, reduce the incidence of overstocking prior to drought. Finally, re-stocking is appreciated not only as a relief measure but also as an instrument for reversing the current trend of growing impoverishment of pastoral people (Heffernan and Rushton, 2000; Heffernan e  $a'_{-1}$ , 2001; Sidahmed, 1998). Re-stocking programmes involve:

- establishing targeting criteria for selecting beneficiary households, such as geographical location, income or consumption levels, household food intake, livestock owned, etc;
- determining the number, age, gender and species of animals to be distributed to beneficiary farmers; small animals are often preferred over large ones because of their faster reproduction rates and the lower degree of risk of holding many small animals
   Ŋ *i* -əŊ *i* a few large ones;

- training relevant staff to select and purchase livestock (usually on the market), and vaccinating, branding and protecting the animals until they have been distributed to beneficiary households;
- establishing whether animals are to be provided to the farmers free of charge or whether a market/subsidized price will be charged; smallholders may also be provided with credit at below market interest rates for the specific purpose of buying animals;
- implementing agencies often require that beneficiary households delay selling or slaughtering their animals for some months; in these cases, a monitoring system should be set up, such as marking animals and recording livestock movements and sales;
- ensuring that complementary policies/programmes are in place to ensure success of the re-stocking programme: unless feed, water and animal health services, as well as food for human consumption, are available to farmers it is unlikely that any restocking programme will be successful.

The following are some of the issues and challenges associated with re-stocking programmes:

- Although difficult, for any re-stocking programme to be successful, it is essential to identify the optimal number of animals to distribute to beneficiary households. However, this will depend on household sources of income; timing of interventions; availability of animal feed, water and animal health services; household size; levels of education, etc.
- Livestock prices are high in the aftermath of a drought and animals may not be available at affordable prices. Traders are often the ultimate, albeit unintended, beneficiaries of re-stocking programmes: they first sell animals to the implementing agency at inflated prices and later buy them back from the beneficiaries at lower prices.
- Unless complementary interventions are undertaken (e.g. food distribution; free/ subsidized provision of veterinary supplies), destitute households may be tempted, or need, to sell part of their re-stocked herds immediately to meet pressing needs, thereby transforming the re-stocking programme into a cash-transfer policy.
- Re-stocking programmes may lead to livestock being neglected during periods of drought and, in the event of inefficient targeting, to fraudulent claims for animals that had supposedly died but were in fact sold on.
- Economic benefits to re-stocked families may be of a short-term nature: returning to the status before drought serves little purpose if households remain vulnerable to shocks. Re-stocking programmes, therefore, should be implemented as part of a broader rural development plan aimed at making livestock keepers resilient to natural shocks.

# Bo 14. LIVESTOCK RE-STR

# 3. Enhancing li e ock prod c i i

If they are to engage in livestock production, households must have access to basic production inputs and mechanisms to cope with the risks inherent in such activities. And if they are to increase production beyond subsistence levels and use their livestock to rise out of poverty, they must also have access to production-enhancing input (including services) and output markets, both national and international. To that end, governments should ensure that livestock farmers have secure and fair access to:

- animal health services and veterinary supplies;
- affordable financial facilities;
- domestic output markets;
- international markets, i.e. trade rules and regulations are fair and equitable.

# 3.1. ANIMAL HEALTH SERVICES AND VETERINARY SUPPLIES: POLICIES AND PROGRAMMES

Animal health services comprise preventive/curative services and veterinary supplies. These may be provided by the public and private sectors: there may be public and private veterinarians and auxiliary animal health professionals; and there may be public and private producers and distributors of animal drugs. Some aspects of animal health systems, however, call for public interventions to preserve veterinary health, manage the externalities of contagious diseases and disease control efficiently, and ensure that smallholder farmers have adequate access to preventive and curative animal health services and drugs (Ahuja and Redmond, 2001; FAO, 2004; Umali and Schwartz, 1994; Umali  $e_a^1$ . 1994).

- Some animal health services/goods are public goods that enjoy the properties of nonrivalry (can be used by many) and non-excludability (those not paying for the goods can use them), and are not supplied by the private sector. For instance, a farmer will have no incentive to control tsetse flies on open ranges because the benefits he generates will extend to the whole community free of charge. For the supply of public goods, therefore, someone must take charge of organizing collective action. This may be done at various levels, from voluntary cooperation in local communities to central government when public goods benefit a large number of people, such as for the control of zoonotic diseases.
- Lack of and/or conflicting information affects the delivery of animal health services, which may lead to opportunistic behaviour. Typically, a livestock farmer is rarely able unequivocally to judge the quality of a veterinarian's service or the effectiveness of the drugs he/she buys to treat her/his animals. Both the service and the drugs are either 'experience' or 'credence' goods, the value of which is impossible to assess e a e. It is also difficult to ascertain their value after use as the physical condition of an animal will depend on a variety of elements, including proper diagnosis and drugs. In order to correct this type of market failure, government should increase the quantity and

quality of information to buyers, e.g. it could limit the issuance of business permits and licences only to qualified veterinarians and sellers of drugs.

- Some livestock services generate externalities. These occur when the actions of some stakeholders in the livestock production chain benefit or harm other actors, without the benefits being paid for or the damage compensated. For instance, a farmer who immunizes an animal against a contagious disease, such as food-and-mouth disease (FMD), reduces the risk that other farmers' herds will become infected, thereby generating a positive externality. However, since the farmer is not compensated for the externality produced, he/she might 'under-vaccinate' her/his herd. The result would be an under-supply of goods generating positive externalities, whereas the opposite occurs for goods that generate negative externalities. In these cases, government is expected to step in and support the production of goods that generate positive externalities (e.g. through subsidies) and prevent the over-supply of goods generating negative externalities (e.g. through taxes).
- When economies of scale are significant and transaction costs high, some goods will not be available on the market (at affordable prices) unless there is some degree of support from the public sector.<sup>6</sup> For instance, despite livestock keepers being willing to pay both for the drugs and the service providers' fees, the drugs may not be available on the market because the high production costs make it unprofitable for private investors to produce them for relatively small rural markets; or because high transaction costs in sparsely populated rural areas make the overall cost of the service including fee, transport and time costs prohibitively expensive. Even though markets work well, therefore, economies of scale and transaction costs may lead to socially undesirable outcomes.

Policy-makers in livestock departments have a whole range of options for improving the delivery of animal health services and veterinary supplies in rural areas. These comprise supply- and demand-side interventions, depending on whether their prime aim is to improve the capacity of the public and private sectors to supply animal health services to farmers, or to enhance the ability of livestock farmers to demand animal health services (Pica-Ciamarra and Otte, 2008). Table 4 gives a list of policy/programme options used by governments to improve the coverage and quality of animal health services and veterinary supplies.

<sup>&</sup>lt;sup>6</sup> Economies of scale occur when the unit cost of production decreases with output quantity; transaction costs are indirect losses that reduce the profitability of market exchanges, such as time and paper costs.

3.1.1. Dece raliza i				
3.1.2. C rec er fa i al heal h er ice *				
3.1.3. Jiha-aialhealh e				
3.1.4. S bc rac i g*				
3.1.5. 'S ar bidie ' øri a e ericeørider *				
3.1.6. C i a i al heal h rker *				
3.1.7. Me ber hiø-ba ed rga iza i				
3.1.8. 'S ar bidie' lie ck far er *				
*Ma bei ele ed b lie ckdeerar e /iirie.				

# Table 4. ANIMAL HEALTH POLICY AND PROGRAMME OPTIONS

# 3.1.1. Decen rali⊌a ion

Decentralization is an increasingly popular institutional reform measure aimed at enhancing farmers' access to public goods/services, including animal health services and veterinary supplies. It involves the transfer of responsibilities from the central to lower levels of government, such as regional and district authorities. Decentralization is based on the rationale that central government is ill-suited to handling such responsibilities because it has limited information about the types of services required locally, and has to meet high delivery costs. Conversely, local governments are said to have first-hand information about what is needed, to face lower transaction costs, and to have incentives to respond to local farmers' requests – as far as they are accountable to them. For any given level of the public budget, therefore, a decentralized system of animal health service delivery may provide more/better services/goods to livestock farmers (Bardhan and Mookherjee, 2007; Lai and Cistulli, 2005; Norton, 2004; Smith, 2001). As decentralization of animal health services is typically part of a broader process of institutional reform, the livestock department/ministry should:

- reorganize the delivery of livestock services in accordance with the main decentralization thrust, namely, de-concentration, devolution or delegation: de-concentration involves shifting administrative responsibility and resources to local governments; devolution involves shifting administrative and political decision-making power to local-level entities; delegation involves shifting responsibility for the production/delivery of specific services to a semi-autonomous organization;
- identify the services to be decentralized (de-concentrated, devolved or delegated), based on a thorough analysis of the advantages and disadvantages of central versus local delivery of public goods, which differ according to the form of decentralization;
- implement, monitor and evaluate the decentralization programme, including a transition phase. As decentralization entails costly organizational reforms, with savings and efficiency gains apparent only after a number of years, it should be seen as a tool for meeting long-term development objectives rather than as a response to budgetary constraints.

Decentralized animal health services are not necessarily associated with improved quality and wider coverage:

• Information asymmetry works two ways: the central government may not know which services/goods to provide; local governments may ay maoS to provnow

## Bo 15. (Cont.)

Polic area –	Before LGA		Af er LGA	
	F nding	Deli er	F nding	Deli er
Crlf aiale∳ideic adeergig dieae	Ce ral G .	Ce ral G .	Ce ral G .	Ce ral G .
				L cal G .
				Priae Sec r
Crlf ze	Ce ral G .	Ce ral G .	Ce ral G .	L cal G .
				PriaeSecr crac
Priif diagic faciliie	Ce ral G .	Ce ral G .	Ce ral G .	L cal G .
			L cal G .	PriaeSec r
			PriaeSec r	
Priif cliicalerice	Ce ral G .	Ce ral G .	Priae Sec r	PriaeSec r
	Priae Sec r	PriaeSec r		
Tick c r l	Ce ral G .	Ce ral G .	L cal G .	L cal G .
			PriaeSec r	Priae ec r
Teecrl	Ce ral G .	Ce ral G .	L cal G .	Ce ral G .
			PriaeSec r	L cal G .
			Ce ral G .	PriaeSec r
Priif eeriardrg, accie,ec.	Ce ral G .	Ce ral G .	PriaeSec r	Priae Sec r
	PriaeSec r	PriaeSec r	Ce ralG fr rider∉e ,CBPP a dFMD	
Arificial i e i a i a d e br ra fer	Ce ral G .	Ce ral G .	Priae Sec r	Priae Sec r
			CeralG.i raii	
Aial ••araie adlieck ifrarcre	Ce ral G	Ce ral G	Ce ral G .	L cal G
			L cal G .	hr gh c rac
				Ce ral G .

Source: Uga da, G er e f, 2001.

F II i gi ele e ai f he LGA: (i) a ber fe blic e eri aria de el ed i c ie a d b-c ie ha e f d he ele beig eri ed b b-c chief h eld ha e a i eri degree, hich ha led c flic be ee e blic ad i i ra r a d g er e e eri aria . (ii) The de el e fe blic e eri aria a he di ric le el i al aid crea e fair c e i i a d hrea e he r i al feri a e eri aria era i g i he di ric . (iii) I a di ric , he er i i fa i al heal h er ice far er ha bee i efficie beca e ab 90-95 erce f he fi a cial re rce ere ed ea alarie a dall a ce a d I 5-10 erce b he ece ar e eri e e a d ai ai a i al heal h i fra r c re. (i) There are area here r er fe eri a e e eri aria are eri a g i h r I er li i ed erice a ailable li e ck far er .

Sources: Az ba-M ke, 2001; Uga da, G er e f, 2001.

# 3.1.2. Co reco er of animal heal h er ice

Limited or dwindling government budgets make it difficult, if not impossible, for livestock departments to provide good-quality animal health services and veterinary supplies in rural areas. Recovering the costs of veterinary services involves charging the full or partial costs of public animal health services/animal drugs to end-users (rather than the entire population repaying them through taxation), which would ease a livestock department's budget-ary constraints and increase the coverage and quality of such services. Major rationales of cost-recovery strategies are as follows: (i) there is evidence that smallholders are willing to pay for veterinary services including public goods, from which they derive a private benefit; (ii) when a service is free, producers see it as having no value and may waste scarce public resources by making excessive requests for it; and (iii) since cost recovery is a demand-based strategy, it increases the accountability of government departments to feepayers, thereby providing incentives for improving the effectiveness of public animal health services and goods (Dinar, 1996; James and Upton, 1995; Keynian e  $a_{i.}^{i.}$ , 1997). Introducing a cost-recovery component in the delivery of livestock services calls for the following:

- Identifying animal health services/veterinary supplies to be considered for cost recovery: these comprise services/supplies with a public-private goods component as well as strictly private goods.
- Establishing whether a fee or levy should be charged. A fee is charged to individual
  farmers and livestock keepers to cover the costs of providing services; a levy is charged
  on a specific segment of an industry, a given group of farmers or livestock operators
  with a collective entitlement to a service. As a general rule, fees are considered more
  effective because farmers pay for private, tangible services/goods, whereas levies are
  not clearly associated with specific activities.
- Once it has been agreed to introduce cost recovery, establishing a price/cost for the services. At the simplest level, this would require calculating the full cost of each service, namely, the value of all resources used or consumed for providing that service, including direct and indirect costs. In the case of public goods, however, one should discriminate between the private and collective benefits of the goods, and only charge for the benefits that farmers gain over and above those accruing to the general public. In any event, the price should not be indifferent, so as to ensure that the farmer does not make excessive demands for the goods/services involved.
- Establishing an institutional mechanism for implementing and monitoring the costrecovery programme, with focus on the quality and coverage of services/goods and their impact on farmers' livelihoods.

Some issues associated with cost-recovery programmes are as follows:

Establishing an equitable cost-recovery mechanism is technically demanding: (i) many livestock services are non-exclusive or rival (e.g. provision of information), and farmers may be tempted to 'free-ride'; (ii) it is difficult to separate the public from the private component of some services/goods, and hence to set the right fee to charge; (iii) the provision of some services involves large fixed costs, which could make the establishment of cost-recovery mechanisms meaningless; and (iv) both producers and other stakeholders (e.g. consumers) benefit from good animal health services and

drugs, thus posing the question as to whether/how the costs of services should be split between all potential beneficiaries.

- Government may reduce the budget allocation for animal health services and thus
  offset any revenue generated by the cost-recovery programme. This would limit its
  overall impact on service provision.
- Livestock farmers are often unwilling to pay for preventive veterinary services and drugs, and/or only medium-to-large livestock keepers may end up paying costrecovery fees, unless targeted information and knowledge campaigns are successfully carried out.

#### Bo 16. COST RECOVERY FOR CATTLE DIPPING IN ZIMBABWE

fZi bab e øre i lala ør ided e eri ar er ice free fcharge The G er е ckid r. The e erice i cl ded di ea e reilla ce, i e iga i a d diaghe li e i, ca le diøøig i he allh lder ec r, a d accia i agai Ne ca le di ea e, a hra, FMD a d rabie. I 1990/1991, Zi bab e e barked 💉 a ec ic r c ral e ୶ r gra e ha i ledi i i alrefr i he ୶ r ii fg dad adi erice bhe ae. The eeriar erice ererefredflligac -recer ra eg, ih alllie ckfar er hkeeøab 85 øerce f he c r'calead99 øerce fall heeø a d g a e øec ed føriaeg dadahare fheir ci cae fg dihø blic/øriaeg dc øe.Oefheele e fhec-recerørgra e a heclleci fafeefr dinni q ca le, a er ice nre i l nr ided free f charge far er. De ni e ca le din rea ick a dick-bredieae (e øeciall Ea Cafeer) i he ai leadig øriae be efi, he G er e decided c i e 🐢 lig he erice ac -rec er bai beca e he high fied c fb ildig direig a k ade i @el i i r ralarea.liiall, he dieei g charge, hich a e b l calg er ec r ihlie ck far er, a a all øerce age f alc . H e er, е i c lai i a reglarlicrea.ed er he beゅe fie ear, b hich i e far er had rec gized he ale fhe erice a dbeg 🛛 🐢 a al 100 erce fhec

Thak hec -recer echai, helie ck devar e a able e re ha ca le-divoi g er ice ere or ided, regardle f he her r f d ere or ided b Ce ral G er e f r hi o roje e. H e er, beca e f he rece ec ic crii, he G er e i l ger i a o ii o rcha e fficie o a iie facaracide, ih he re l ha c al divoi g ha e bee l o e ded a dore i l c r lled a i al diea e ha e beg avo ear agai.

Sources: Hargrea e , 2002; Phiri, 2006.

# 3.1.3. Join h man-animal heal h em

There are similarities between human and animal diseases and in human and animal health service delivery systems. It is therefore possible to accrue savings by sharing the production and distribution costs of human/animal health services and drugs, especially in the remote

# Bo 17. JOINT ANIMAL-HUMAN HEALTH SERVICES IN CHAD

I Chad, he acciai raeihigherilie ck ha a g he ୶ rali he el e, fr h a i al are he aj r rce flielih d. Fll i gc la i i h adic iie, he Gerec cl ded ha a ji ha-a i al accia i ca eaig elli ୶ re he accia i cerage a gh a .Be ee 2000 a d 2005, eil igh ca 🕐 aig ere la ched i er ice frhe delier fha a daialhealh erice. I ୶ aric lar, 14 acciai ca 🐢 aig fr adic childre, e a dlie ck iie c ce raed rig hedr ea ere c d c ed i area here he c : 149 255 li e ck ere acci a ed agai a hra, e rell i, blackleg a d CBPP; 4 653 childre ized (hree d e each) agai dieh heria, h ei gc gh, e a ere i a d ∉ li ; a d 6 284 e recei ed a lea de fea acci e.

The jih a -a i al accia i ca øaig ge era ed a ig i he rder f 15 øerce, largel hak he harig fe@iø e (e.g. refrigerar) ad ea fra 🖝 r. eer, acciead c able ( ri ge a d eedle ), hich acc ed frheblk fc, cld be hared be ee he h a a d a i al heal h a h ri ie . Efficie c a i q ere al b ai ed beca e i a 🍙 ible acci a e ab 140 e e e er da c ∉ared iha a erage f100 he Ih a acciai ere carried .Fll ig hi e øerie ce, Chadia ø blic heal h a d e eri ar fficial e i aged i i i alizi g jia ial-ha accia i ca ∉aig cerhe ajri frraldiric.

Source: Schelli g et al., 2007.

#### 3.1.4. S bcon rac ing

Public authorities may subcontract delivery of animal health services and veterinary supplies to private practitioners in order to improve both the quality and coverage of services. The assumptions here are that (i) inefficiencies/disincentives within the government bureaucracy would be reduced; (ii) there would be definite savings in the public budget, as many public veterinarians/animal health assistants would no longer be public civil servants; and (iii) private animal health service providers, assured of a minimum remuneration, would also be expected to supply goods and services not otherwise offered to rural households (Chapman and Tripp, 2002; Fassi-Fehri and Bakkouri, 1995; Rivera  $e_a I$ , 2000). Subcontracting public veterinary services to private actors calls for the following:

- Identifying public services/goods to subcontract to private service providers. In theory, the provision of all public goods may be subcontracted to private agents, but a tradeoff exists between gains in efficiency through subcontracting and monitoring costs to ensure that the services/goods are provided effectively.
- Deciding and selecting who will supply the services/goods on behalf of the state, e.g. veterinarians, animal health auxiliaries, community-based organizations, wholesalers, retailers, NGOs or other private agents.
- Drawing up a contract setting out the tasks of, and compensation schedules for, private service providers. As a general rule, contracts should relate to simple tasks and compensation be based on output in order to facilitate monitoring (e.g. number of livestock vaccinated; number of abattoirs inspected).



 Setting up a monitoring system to ensure that contractual obligations are met. Since ineffective supply of some public goods may generate significant socio-economic losses (e.g. spread of animal diseases), government should be ready to provide the subcontracted services/goods itself in case the subcontracted agents do not fulfil their obligations.

Designing and effectively implementing an efficient system of subcontracting is a challenging task:

- Different contracts should be designed for service providers operating in regions with different livestock/population densities and levels of economic development. Offering the same compensation schedule to all subcontracted agents, regardless of where they operate, may lead to an under-supply (or over-supply) of animal health services in remote (peri-urban) rural areas, where markets are small (large) and transaction costs high (low).
- Subcontracting may distort the functioning of other markets because, having a guaranteed remuneration, the agents may provide private goods/services to farmers at below market prices, ultimately establishing a monopoly/oligopoly in the supply of private veterinary services.

- In some cases, private agents are unwilling to supply public services/goods that might undermine their credibility and/or have a negative impact on their private business, such as culling overtly healthy but potentially infectious animals.
- In many countries, the institutional infrastructure necessary to assess the performance of subcontracted agents is limited, thereby preventing government from designing and offering enforceable contracts to private service providers.
- Political/social concern about the downsizing of public-sector staff frequently creates obstacles to subcontracting services to private providers.

## Bo 18. SUBCONTRACTING ANIMAL EXTENSION SERVICES IN MALI

I 1991, he G er e f Mali ade a ar dece ralizi q a d eri a izi q he eel fagric I ral a dli e ck er ice . The Projet d'appui au secteur prive de l'élevage (Pr jec frPriaeLie ck-Sec rS 🐢 r), f ded b Fre ch C 🖉 era i i heregi f Sika . Ka e a d M ø i, heløed regi al agric I ral cha ber (RAC) bc raca i ale e er ice 120 eri a e eri aria a deara e eri aria i 4500 illage. The bc rac ed age ere al e i led ell dr g, accie a d herie (chaflra∉) far er eriael. The ere re era ed he bai f ber fillage iied (ih a fi ed ra e f US\$20 øer illage øer ear) a d ere re ired re ør RAC i h regard he ber fraiiqei rga ized i he illage. RAC fficer i i ed a lea 15 erce f he illage reached b he bc rac ed age check ha raiigei had bee , i fac , held; •a e ere ade hereaf er, b e fal e rec rd a e qh cacel he h le ୶ a e a d c rac. Af er e ear, he Sika RAC i er ed he delbgiigee i cher illage ra her ha bc racigeria e e i cher, al ed a US\$17, 🕐 rcha e a arie fer ice age ; illage c ld e he er ided beri a e eri aria a deara e eri aria. The erice a ailable, c a d i ab kle, ad hile far er ere free re<sup>4</sup>e a h rized rai er ere e her erice/g d he had erica hif he c e ceeded he al e f heir cher . Thi e e 🖸 ered helie ck far er, beca eib hicrea ed heir bargaiig 🖉 er adcreaedc 🛭 eii a g e e i age . I he regi f Sika , here ab 40 e eri aria • Ir ere acci a ed agai Ne ca le di ea e; 1 250 illage recei ed ad ice hee adgadieae, ad 15000 all ria ere acci a ed; 175 illage a e ded rai i g 🖝 gra е r ୶ a ia i c r l; a d 500 fl rae ere ld. The bc rac ed ffered heir er ice far er a eri a e ba i (eri aril fr he ale f acage al cie a d dr g) a d achie ed a erage i c e f US\$740 ∉er ear.

The ø blic-øria e øar er hiø be ee RAC a døria e eriaria /øara e eriaria c rib ed e e dig hec erage a dicrea ig he ø ali fa i al e e i er ice i r ral Mali. I al ør ed criical i i la iga arke frøria e a i al heal h er ice a d e eriar øølie i r ral area.

Source: Fer e -Q i e a d Ga hier, 2002.

# 3.1.5. 'Smar b idie ' o pri a e er ice pro ider

Economies of scale and transaction cost considerations sometimes make it unprofitable for private actors, including animal health service providers, to offer private services and goods

psnsurng ovidson pubiciin eas. dedeas.ns dequstong pcdiaealtaurvice s/oods .-TJ01.4003 -2.889 Dd(pTh )-1 iepderiecs)oviderd by theea, whichdedue siusapthei1plimitediu38(desouu38(de s -28(ato)-28(pbuy -28(arc

off support to all prospective service suppliers. Since this is rarely the case, governments sometimes fix the prices of services and drugs. But in this way, they reduce competition and market efficiency.

# Bo 19. AGRICLINICS AND AGRIBUSINESS CENTRES IN INDIA

The Deear e f Agric I read C erai (DAC) f he Miir f Agric I re, G er e fIdia, i a cia i ih he Nai al Bakfr Agric I read R ral De el 🦛 e (NABARD), rece l la ched he Agricli ic a d'Agrib i e Ce re Sche e #øle e heeffr fq ere ei е a d ake a ailable 👩 e ar ✔ a d er ice eed far er . The che e ai rce fi 🐢 rai agric I ral ihla e ¢agricliica dagribie cereir ral grad a e a d ∉r ide he area, hereb i laighe  $\phi \phi$ l-ide fa arke fra i alhealh erice a dg d. I ୶ ar ic lar, agricli ic are e ୶ ec ed 🛛 🛷 r ide er ice a d'ad ice far er a d'li e ck keeøer; he agribie ce re are ie ded fferiø adfar e<sup>u</sup>iø e, bhfr aleadfrre.The cheerkafll :a - hraiigc reiereøreerhive a db i e a age e i vr ided free f charge agric l regrad a e i ere ed i e i g 🖌 heir bie i rralarea. Grada e he drafa bie ୶ la frheir 🕐 🕐 ed agricli ic/agribie ce re, iha ai e i aed c fR. 1000000 (US\$20 000) fridiid al, a d R . 5 000 000 (US\$100 000) frgr 🖌 🖝 rjec . I a ciai i h NABARD, DAC er ide a 25 erce b id he capial re@ired fr e i g p agricli ic /agrib i e ce re:10 erce i c rib ed b he er icie a a d 65 erce i fia ced hr ghbak øriri le dig er . The reøa e øerid arie be ee fie a d e ear, a d i cl de a a i grace øeri d f ear. The agricli ic /agrib ie ce re aree øeced be e ø i hi i h f hedibre e f hefir la i al e .I rder heløagric I ralgrad a e e ø hecliic a dce re, heG er ber f'er jec del', i cl di g: eri a e e eri ar cli ic; e fIdia,∉r,∉ ed a le frfeedad edicie; a deriae e eriar ✓riae e eriar cliic i hare ail cliic ih all, eria e arificiali e ia i ce re.

The che ea¢qear rk elli herelaiel de el qed a e a ddi ric. H e er, i d e aqqear be aqqer qria e f r back ard di ric beca e f er li i ed de a d b far er f r qria e a i al heal h er ice a d e eri ar qquie.

Sources: Bai h a, 2009; Shekara, 2001; .agricli ic . e .

## 3.1.6. Comm ni animal heal h orker

A popular instrument for ensuring the supply of private animal health services in remote, low-income rural areas is the institutionalization of community animal health workers (CAHWs): local people trained to deal with the most common livestock diseases, using a small range of simple equipment and drugs. The CAHWs are considerably less expensive than fully trained veterinarians as they have lower expectations in terms of income and face lower transaction costs because they act locally. CAHWs can supply private services and be

awarded government contracts to supply a range of public goods to farmers (Curran and MacLehose, 2002; IDL, 2003; Peeling and Holden, 2004). Establishing a functional network of CAHWs calls for the following:

- Ensuring legal recognition of CAHWs, including identification of the services/drugs they are qualified to provide/sell.
- Establishing selection criteria for potential CAHWs, possibly in consultation with local communities. In general, CAHWs live locally; are experienced livestock herders; have other sources of income; are willing to set up their own business; and are known to, and trusted by, the community.
- Training CAHWs. Courses last anything from a few days to several weeks, and include subjects such as disease detection and prevention, animal treatment, accounting and bookkeeping, etc., all of which are necessary for the proper running of a small business. The cost of such training courses is generally modest.
- Holding regular refresher courses to review key topics, cover new treatments and husbandry practices, and provide opportunities for CAHWs to share their experiences.
- Providing basic equipment. CAHWs are often given a basic kit of equipment free of charge. This contains syringes, needles, thermometers and a small stock of basic medicines, thus allowing them to offer their services without delay.
- Establishing an institutional and legal mechanism to facilitate cooperation among CAHWs, animal health auxiliaries and veterinarians, who always remain responsible for the more sophisticated diagnoses and treatments. For instance, CAHWs could regularly report to veterinarians or to animal health auxiliaries who would then report to veterinarians.

CAHW initiatives have been implemented in almost 50 countries since the 1970s; some of the major challenges encountered are as follows:

- As the law stands in several developing countries, many of the services that could be provided by CAHWs – including diagnosis and treatment of animal diseases, and the handling and distribution of vaccines and drugs – are still considered as 'acts of veterinary medicines' provided only by registered veterinarians.
- The rapid, rather rudimentary training of CAHWs is sometimes insufficient to ensure correct diagnosis and medicines (use of appropriate drugs, dosage, duration).
- Governments are accustomed to providing CAHWs with drugs and equipment to start up their business. The long-term sustainability of CAHWs, however, depends on the existence of a regular distribution system or an efficient market for such basic inputs, which is rarely the case.
- Even though CAHWs are private actors, the tendency is for governments to consider them as a social appendage to the public sector because they provide services to the rural poor. Therefore, governments sometimes fix the fees for CAHW services, but that may undermine their profitability and sustainability.
- Both veterinarians and animal health auxiliaries may exert political pressure on government not to give legal recognition to CAHWs. The assumption here is that recognition of CAHWs would make it unprofitable for veterinarians/auxiliaries to work in rural areas.

# Bo 20. COMMUNITY-BASED ANIMAL HEALTH WORKERS IN SULAWESI, INDONESIA

The bjecie f he Deceralied Lie ck Serice Prjeci Ea er I d eia, hich ared i 1996, a heløg er e e ablihlie ck-rela ed i i i i h a ie be erre ø dig he eed f all-cale far er, icl dig he re rce-ø r. T haed, heørjec de eløed ad e ed e del flie ckericeørii i frdirici rhad hSlaei, icldighee ablihe fCAHW. Aciiie ih a ୶ ar icina r r ral annerai al e ercie i differe c iie. Drighe bega areraial, li e ck far er ide ified a i al di ea e a d e racce e eri ar er ice a a g heir bi di g c rai , a d agreed ha he e abli h e f CAHW igh ell be an er a e f r i er i g acce , a d he aff rdabili f, baicai al heal h erice.Eachc i iaedareøreeaie, ha fir raiedaaCAHWad he gie a fla 🛛 🛉 rchae eeriar e®i 🦗 e addrg, hich e abled hi /her er ide baic cliical a i al heal herice c i e ber agai a fee. The di ric l cal er ice (DLS) ga e legal rec g i i CAHW biiahe i h cer ifica e ha ere re e able a earl bai. M hl ee i g ere held ør ide c i. raiiq CAHW,all e chagee erie ce adhlddici he i h DLS. The CAHW al e 🖸 a cia i reere e heiri ere a d ice heirc cer . The ør jec cceeded i i ør i g he c erage a d ali f a i al heal h er ice i hefrdiric herei øeraed, ad CAHW adeg dør fi ihiab hreeh; hi er ed criical fr ai abili fheijiaie. Fll i ghe eil -f r øhae, heG er e al bc raced CAHW fr he øøl fø blicg d,icldig lie ckacciai, ihaig i herage f20-40øerce er heøre i ce ralized deli er echa i .

Source: Lek a d Y g, 2002.

#### 3.1.7. Member hip-ba ed organi<sub>k</sub>a ion

Membership-based organizations (MOs) include producer associations, cooperatives, rotating savings and credit associations (ROSCAs) and other community-based organizations. MOs help their members gain access to animal health services and veterinary supplies because, by sharing the fixed costs among all members (e.g. a veterinarian's travel costs) and gaining bargaining power based on bulk orders, they can pay for the services of a veterinarian/animal health assistant and/or buy animal drugs at favourable prices (Kurup, 2002; Omore  $e_a'$ , 1997; Owango  $e_a'$ , 1998; Stringfellow  $e_a'$ , 1997). Supporting livestock-focused MOs, therefore, could be a way of increasing the access of livestock farmers to animal health services and veterinary supplies. This would involve the following:

- Granting legal status to MOs to enable them to recruit/contract veterinarians/animal health auxiliaries and to buy veterinary supplies and/or sell them to their livestock farmer members.
- Defining rules to govern the relationships among the public, the private sector and MOs regarding the provision of animal health services/drugs. This is important, because MOs are a 'third actor' in the supply train for animal health services and

drugs; and as they usually operate under special laws (e.g. tax rebates), they may distort market functioning.

•

## Bo 21. MEMBERSHIP ORGANIZATIONS IN GUJARAT, INDIA

Meh a a i e fhe 19 diric fhe Sae fGjara i Idia, a dha a 🗸 🗸 la i f all a d la dle ab 3 illi , f hich ab 80 øerce li e i r ral area . Margi al, far er h ld ab 67 øerce fall ilka i al i hediric. The Sae Deøar e f A i al H ba dr ør ide lie ck erice far er b , beca e i øed ab 95 rce fia albdge alarie, i ca eld er ide fficie a i al acci e a d far er. Taddre heec rai, he Mehaa Diric C øeraie Ui, he dr q ai bjeciefhichi e ber ilk, ha al helø i arke heir røl ar ed 🐢 ligeeriar erice a ddrg i e ber. The i fll a hree-er ged anner ach: (i) A he illage le el, e eri ar fir aid i nr ided b he dair c nera i e hich illager ha e al a ha ded er heir rel cie ie (DCS), ilk. The i ha e vi i 🐢 ed each DCS i h a e eri ar fir -aid ki a a e-ff gif a d ha rai ed a 'fir -aid rker', h charge i e ber a ke R.1, er ii a d ell dr g a dre-age . (ii) A he far gale, e eri ar er ice are er ided b 35 e eri ar bile cli ic , each c 🛭 🛉 riiga e eriaria, a a i al heal ha iliar a da ehicle i h drier. Each bile cliic ∉era e al ge ablihedr e, a derice are chargeda hera e fR.40 fr eer e callad R.20 frre≉ea call. The charge c er hec fra ∉r, drg a d he e eri aria ' fee. A eical call c e R . 77, he differe ce bei geaid b he bile e eri ar 🛛 i 📌 era i. (i.e. hr gh e ber hie fee ). I 1999-2000, he 35 ig i Mehaare ୶ ded 234 196 call (ab 18 call er da er bile cli ic). (iii) Fiall, a i alhealh ca 🐢 are he i 'an 🐢 ach ide øread heal h ør ble ch a i fer ili , reeea breeder a d e ab lic di rder . Ca e are rga ized heiiiaie facl er fDCS i h ecific herd heal her ble , a d are a e ded b a large ber flie ckkeeøer, e eriaria fhe i a døeciali fr cllege, i eriie a d he Sae Deøar e fAial Hbadr. A al f22424 a i al ere rea edi ch ca 🔹 i 1999-2000.

The i de raeh far er rgaizai, if ell rgaized, ca cce f ll øøl heir e ber i h b h a i al heal h er ice a d dr g / acci e. H e er, i h ld be ed ha I dia ha a I g radi i f øø r i g dair c øera i e, hich c rre I er e re ha 10 illi far er i er 80 000 illage.

Sources: K r , 2002; .i diadair .c

# 3.1.8. 'Smar b idie ' o li e ock farmer

One way of promoting a market for animal health services and veterinary supplies is to provide a 'smart subsidy' (typically a voucher) to livestock farmers for the purchase of livestock services/drugs on the market. This contributes to healthier animals, improved production and productivity and increased household incomes – one of the most critical conditions for the existence of a livestock services and drugs market (Auisi, 2007; Castañeda, 1998; Gregory, 2006). The distribution of 'smart subsidies'/input vouchers for specific services/goods is a typical form of public support to less well-to-do households. It involves:

- identifying and selecting livestock farmers entitled to receive input vouchers for animal health services and veterinary supplies (e.g. targeting parameters may include household income; livestock dependency; location, etc.);
- deciding on the value and characteristics of vouchers, which should not be equivalent to cash; for instance, the value of vouchers may be offset against the market price of a standard set of livestock services; exchanges of vouchers among beneficiaries may be prohibited; vouchers may be used only within a given period of time, etc.;
- establishing mechanisms for distributing vouchers to livestock farmers and for managing cash redemptions by service providers/drug sellers;
- defining a clear time frame; in theory, voucher programmes should run for only a limited period while subsidies are gradually removed as smallholders and service providers create and sustain a functional cash market for animal health services and vaccines/drugs.

Setting up a functional voucher system to help livestock farmers gain access to animal health services and veterinary supplies is a challenging task:

- The costs for government are often high. Over and above the value of vouchers, significant transaction costs are involved in distributing vouchers to hundreds, if not thousands, of eligible beneficiaries dispersed throughout the rural areas, and in setting up a voucher redemption system.
- Although vouchers are usually recipient-specific, a secondary market often develops whereby vouchers are sold and exchanged, and eventually redeemed at a lower value.
- Small-scale farmers may not be able to reap the benefits of input vouchers when there are few, if any, private providers of animal health services and veterinary supplies operating in the rural areas.

- Input vouchers might cause economic distortions, as they may force livestock farmers to buy predetermined animal health services that are not always the most appropriate.
- To promote and sustain a market for livestock services and related goods, voucher programmes should be in place for a specific period of time, such as five years. The financial commitment of governments, however, is typically of shorter duration.

# Bo 22. INPUT VOUCHERS TO ROMANIAN FARMERS

I 1997, R a ia i ୶ le e ed a US\$200 illi (i 1997 ୶ rice) i 🐢 cher 🖝 gra e helø far er b ke i ø i crea e heiragric I ralør d ci a dør d ci i . The eiledhediribif cher all far er i ga lea 0.5 ha fagric I ralla d (far i h le ha 0.5 ha ere c idered a h e garde ). Each be eficiar far er a e iled e cher er hec are flad ed rleaed, 🐢 a ai f6ha. The ale feach cher a e a US\$18 frhea f 1997. hich reøre e ed ab 30 øerce f he a erage i ø e øe di re øer hec are, i cl di g eed, fer ilizer, e icide a d f el. A he i e be ee cher di rib i a d he a hr,90 ∉erce fhe cher ere ed b eligible i ୶ a d I 10 ∉erce ere re-ldr ed b herg d. The ୶ r gra e a de ig ed b heMiir fAgriclreadi,ele e ed hr gha berfgere i i i / age cie; ad h cage c a e abli hed a age cherdirib i a drede ୶ i . I øar ic lar, he bai f cada ral rec rd , I calg er e ide ified e ial be eficiar far er a d c ica ed heir a e he Naial C i i frlfraic, a derificai. The Prijd Hefhe Ceral Bak eried ab frc lida i ec ri øaøer, a dø ffice di rib ed he 10.2 illi cher far er.C ercial back redee ed cher a dicharged a c i i f l 0.5 ø erce heir al e beca e he Mi i r f Agric I re re 🏾 ired ha cher h ld be ca hed i hi a аi fhree frda.

The R a ia cher or gra e i e e a or le fa cce f II de ig ed a d i or le e e d'ar bidie 'or gra e. H e er, e al a i ha bee ade f i or a agric I ral or d c i a door d c i i, r f i caoraci e ablih elf-ai ig arke a d, l i a el, i or e far er 'li elih d.

Source: Ca a eda, 1998.

#### 3.2. LIVESTOCK-RELATED FINANCIAL POLICIES AND PROGRAMMES

Inadequate financial services (including credit and savings facilities) in rural areas prevent livestock farmers from making good use of their livestock and other assets and getting a foothold on the ladder out of poverty. Public actions are needed to facilitate access to credit for rural dwellers, including poor livestock farmers, because the private sector finds it unprofitable to operate in low-income rural settings owing to scarce and asymmetric information, high transaction costs, lack of farmer collateral, and highly co-variant, risky agricultural production activities (Hoff and Stiglitz, 1990). Traditionally, governments in developing countries have set up state-owned specialized financial institutions to receive concessional loans from government for on-lending to agricultural producers at below market interest rates for specific types of inputs or investments. While these interventions have improved access to finance and contributed to

Table 5. RURAL FINANCE POLICIES AND PROGRAMME OPTIONS
3.2.1. Prfli dierificai adfleibili *
3.2.2. Lie ckac llaeral fria
3.2.3. Wareh e recei¢ e
3.2.4. M bile ba ki g
3.2.5. Bra chle ba ki g
3.2.6. Me ber-ba ed fi a cial i i
3.2.7. Credibrea adcrig
*Ma bei øle e ed b lie ckdeøar e /iirie

# 3.2.1. Por folio di er ifica ion and fle ibili

Financial institutions rarely provide their services to smallholder farmers because it is difficult to assess their creditworthiness and they lack collateral. Another reason is that, ultimately, agricultural production activities are notoriously risky owing to climatic variability, unpredictable pest and disease outbreaks, and other variables independent of farmer behaviour. There is, however, evidence that, by diversifying their rural portfolio, i.e. by financing a variety of farm and non-farm investments in rural areas, financial institutions may both reduce their risk exposure and make good profits from providing financial services to smallholder farmers. Portfolio diversification is not straightforward for financial institutions, as it involves radical changes in the way they screen potential borrowers and distribute loans (Klein  $e a'_{..}$ , 1999; Wenner  $e a'_{..}$ , 2007; World Bank, 2005c). A government may facilitate portfolio diversification through training courses, grants/subsidies for start-up and experimentation, development and dissemination of appropriate technologies, facilitation of experience-sharing with financial institutions of other countries/regions, etc. In general, in order to diversify their rural portfolios, financial institutions should:

- screen households eligible to receive loans by examining all their sources of income, rather than just requesting collateral against loans; for example, a small farmer who owns a few hectares of land, some scavenging poultry and a small handicrafts business might well be a reliable borrower because she/he is expected to have a stable, albeit relatively low, income; conversely, a farmer who depends on a single crop or animal species, or who is too dependent on irrigation may well have a higher average income but its variability would not make him/her a particularly reliable borrower;
- appreciate the complexity of the household economy as a whole by taking account of interrelationships between consumption and production decisions, household time preferences (e.g. current consumption is often valued more than future consumption) and risk-attitude – rather than only looking at the agricultural production function;
- offer potential borrowers tailored, flexible loans to match individual household characteristics; for instance, instalments may vary across the year; there may be few, if any, penalties for postponing one or more monthly payments; repayment terms may be extended under specific circumstances, etc. – tailored loans and flexibility help banks to address borrowers' difficulties before they get out of control and, therefore, to ensure that most loans are repaid in full.

Exogenous shocks (e.g. drought, floods) regularly affect rural areas and, as they have an impact on most, if not all, farmer activities, easily transform a good borrower into a bad one. Formal and informal insurance mechanisms and/or targeted safety net programmes for households (with a good repayment history) are thus powerful incentives for financial institutions to start diversifying their portfolios and to operate in low-income rural settings.

Portfolio diversification may in theory seem to be a profitable business model for financial institutions willing to operate in rural areas. In practice, however, there are serious constraints to implementation:

- The majority of financial institutions only have branches in urban and peri-urban areas. Opening new branches in rural areas involves high investment and maintenance costs, one reason being that the low population density in rural areas (few clients) makes the investment:return ratio unattractive. Moreover, bank officers may be unwilling to live and work in rural areas.
- Offering tailored and flexible loans to rural dwellers increases the unitary cost of loan assessment and management. Such loans may also contribute to liquidity constraints, especially for small financial providers, owing to seasonal demand for agricultural credit (in the sowing season).
- Limited human and financial resources may prevent governments from providing adequate support for financial providers to expand their business ventures.
- Financial institutions diversifying their portfolios into rural areas do not necessarily serve very poor farmers who lack collateral and live outside the cash economy.



# Bo 23. CAJA LOS ANDES IN BOLIVIA

Caja L A de e e di La Paz, B li ia, i 1995 a he fferi g f Pr credi , a fi a cial NGO f dedi 1992 ih 🐢 r fr he Ger a c lig fir, lerai al Prjec I. Oer he la decade, Caja L. A de ha bee e ୶ a digibie i rral C area, b ea f: (i) ra egicall elecig hel cai fir ral ffice, f c ig all h b i de el 🐢 🐢 la ed r ral regi ; (ii) de el 🐢 i g a 🐢 ecific le di g ech l g fallh ehldørdci/c ba ed ilaeaee a cia ed ca h fl ; (iii) recriigl calagri he i baicec ic a dba kig ør ced re, icl de e ear′ - he-jb raiig; (i) «revari ga livelici fdibre e /reva e vela a ch he eed fi di idehld (fri ace, re∉a e i al e liked he cr 🖸 c cle; reøa alr ralh е a fa il 'ree e fl, e c.); () de el ୶ ig i ୶ le c 🕐 er fare ched le ba ed ha crea e bala ce hee a d ca h fla e e freach 🖸 e ial brrer, hereb all igfrdece ralized I a dibre e (brach a ager are re 🐢 ible frI a f US \$5 000, a dregi al direc r f r 🐢 \$20 000); a d (i) l a fficer i edia el • h ha e i ed a reșta e i al e, a d helșt he rer c re heirb ii i clie e befre he i a i ge fhad. Defalig clie are reteired 🕡 a a 🖉 e al , herea h e i g d a digare ffered l er i ere ra e.

The e erie ce f Caja L A de de ra e he 🖸 e ial f ai able fi a cial irralce.Tda,Caja'la fi era i r ral clie acc fr9 erce erall 🖉 r f li a d f r 15.3 ø erce f all l a a ø ø r ed. H e er, ø rer clie i re re e area are er ed b he Caja: bra che ha e bee 🛛 🐢 ed i all r ral i. ihdiere ice rder arge clie rce .

Sources: Pearce et al., 2005; V gelge a g, 2001.

# 3.2.2. Li e ock a colla eral for loan

Financial institutions prefer to lend – and at better rates – to borrowers who can offer collateral against loans. Most rural households in developing countries do not own real properties to use as collateral and are thus rationed on the credit market. But many of them possess – albeit not in a form that could be used as collateral – a wide array of tangible assets that have a market value: standing crops, live animals, farm machinery. Institutional/ legal reforms to transform these assets into valuable collateral would contribute to develop-ing rural financial markets (de Soto, 2000; Fleisig  $e_{a_i}$ , 2006; Safavian  $e_{a_i}$ , 2006). The following conditions are required for this to be feasible:

- Financial institutions should be allowed legally to accept a variety of goods/assets as collateral, such as large and small ruminants, poultry, farm machinery, etc. In other words, they should be able to repossess such assets in the event of default.
- Financial institutions should be trained (or able) to value livestock assets, i.e. the current and expected value of income to be derived from livestock in different production systems.
• In theory, there should be no limit on the amount of movable assets a financial institution can accept as collateral, including livestock. However, such items are seen as

# Bo 24. CATTLE AS COLLATERAL FOR LOANS IN URUGUAY AND THE STATE OF KANSAS (UNITED STATES)

Urgaadhe ae fKaa, bh fhichhaeac ୶araieada ageilie ck ordci,area g he rld′ c ∉e i i e beef e ∉ r er. H e er, heir fi a cial arke frlie ck øera rare arkedl differe : i Urga, ld acceø li e cka c lla eral, herea i Ka a ca le are ee a ø ibl he be e f cllaeral frla.(i) Urgaala ake i er diffic l crea e a ec ri i ere i ca lea i reº ire i e fcllaeral bee era ed, i.e. fi a cial i i are e 🖊 ec ed ide if each head f ca le ed a c lla eral a d i r heir eb he er. herie ellhe ih ifiq hebak. Ic ra, hela i Kaa h iah frabidig agree e ecred b'aflaig ecriiere'i, a, US\$200000 all i cale, ih he bak haiga'c i ig ecri i ere 'i he ør ceed fhe far , regardle f he her he ca le ha e bee Id a d he e 🖸 i a ba k acc r b a rac r. (ii) I Ur q a , i i e re el diffic l check he her here are eri r eri r clai he c lla eral, herea here are e blic regi er i Ka a fr hich a fia ciali i i ca eail acºire ifrai li le c he ize a d e<sup>4</sup> e ce f he ec ri i ere i a far er' li e ck. (iii) I ake ab i i h ear, a d ac llegalørce, fra Urgaa fia ciali i i ree e a d ell c lla eral, all ed reø e abrr er' hera e , cha heør ceed fc lla eral a di i ale. I Kaa, cale edac llaeral aberer e edad ldialileafie da. Thi c 🕐 ari føracice i Urga ad he ae fKa ah h i i i al refr, hich are fe I -c 🖸 lic 🖸 i , ca be criicali facilia i gacce fia cefrfar er a d $\bullet$ r iglie ckec r de el $\bullet$ e. Tha aid, bh Urga ad Kaa hae a id riall ad a ced cale ecr. Therefre, he 🖲 e i reai a he herrefrig clla eral la ia effecie a feedig acce credi al all far er i radii allie ckord ci е.

Source: Flei ig, 1996.

## 3.2.3. Wareho e receip em

Warehouse receipt systems allow farmers to use their surplus crop or livestock production as collateral for loans. These systems work as follows: smallholders deposit their surplus crops or livestock products in a public or private warehouse; the warehouse issues a receipt certifying the deposit of the goods, including their quantity and quality; and the farmer uses the receipt, which has a commercial value and can be easily liquidated, as collateral for loans. Three parties are involved in this transaction: the farmer, who takes his/her surplus produce to the warehouse; the warehouse operator, who classifies the goods and determines their value; and the financial institution, which grants a loan based on the receipt issued by the warehouse operator (Coulter and Onumah, 2002; Coulter and Shepherd, 1995; Lacroix and Varangis, 1996). Public actions to support the establishment of warehouse receipt systems include the following:

- Identifying agents eligible to manage warehouses, including producers, farmer groups, traders, processors, exporters or ad hoc public/private institutions. The latter case is the most frequent.
- Legally allowing warehouses to define quantity, quality and grades of the stored products (so there is no need for interested parties physically to examine the goods) and to issue relevant receipts. Processed livestock products for which receipts may be issued include salted or chilled meat, skins and leather products, powdered milk, etc.
- Making warehouse receipts legally transferable for use as collateral for loans, i.e. upon presentation of a receipt to the warehouse, the holder will receive either the stored goods or their fungible equivalent.
- Setting up an information system on prevailing prices and trends to facilitate the use of warehouse receipts as collateral for loans. This is because swings in market prices determine changes in the value of agricultural/livestock commodities and, hence, in the value of warehouse receipts.
- Establishing a certification and inspection system for licensed warehouses to provide guarantees to actors in financial markets, as well as an institutional mechanism to address quickly potential conflicts relating to the quantity/quality of stored agricultural commodities.

Establishing an effective warehouse receipt system is demanding, for the following reasons:

- The costs of establishing and running a warehouse are high, but typically decrease the larger the quantity of produce stored. Because the surpluses of agricultural products are small in many developing countries, the public cost of establishing a warehouse system might be more than its potential benefit.
- Given the high transaction costs associated with numerous small deliveries, warehouse operators are often unwilling to serve farmers or farmer groups depositing only small volumes of commodities. Furthermore, smallholders find it difficult to accumulate large surpluses and meet the quality requirements of warehouses.
- Even when there are legal/regulatory mechanisms that inspire confidence in warehouses, financial institutions tend to grant loans on only a (small) proportion (50 to 60 percent) of the market value of stored goods.
- Storing livestock products necessitates some form of processing. Modern small-scale
  processing facilities and preservation technologies are, however, rarely available in
  rural areas or are prohibitively costly for small farmers, and traditional processing
  methods do not meet the quality requirements of warehouses.
- A warehouse system is economically self-sustainable as long as there are regular market price swings that allow the farmers to pay for storage (they deposit their agricultural products in the flush season when market prices are low, and collect them in the lean season when prices peak). However, increased storage by farmers reduces seasonal price variations and minimizes trade margins, thereby diluting the profitability of warehouses; in many countries, agricultural prices are even fixed by central government.
- Because of the uncertainties surrounding long-term price trends, financial institutions tend to provide only short-term loans when warehouse receipts are used as collateral.

#### Bo 25. WAREHOUSE RECEIPT SYSTEM IN ZAMBIA

The Na ral Re rce I i e f he U i ed Kigd ha bee a i i g a ra ge f Za bia øarie i cl di g g er e , far er , ba ker , rader a d iller dra 🔹 a d i ele e a reg la ed areh e receie e, hai, ae rk føriael a aged areh e a h rized i e ra ferable areh e receiø g ara eed b a ø blic cer ifica i a di ቀeci e.l rder er e he large 💉 ible ber f far der he Za bia e: (i) Al caøi al hreh ld (US\$50 000) i e fr areh er. e re 🖸 e i e heir e rh;h e er, a🕫 lica e ablihig areh e ha ca ei her rlea e rage øace c ercial er , ee a ber f le c crieria, er ide a fi a cial erf r a ceg ara ee, be er fe i all c eee, a d illi g а cedi eci. (ii) The ii grai dee ii e a be ee acceø fre@ e 10 a d 30 e i rder ake he er ice a ailable he large 🛛 🙍 ible ber f ac r. Maize, hea a d bea ha e bee accee ed b areh e da e, al h gh here are ୶ la e ୶ a d he ber f rable er d c . (iii) Wareh e era r are e øec ed charge arke -le el rage ra e , i.e. be fi a ciall elfai i g. (i) Rb с di gradigad eigh a dard ha e bee e, a d areh e era r are rai ed/cer ified i c di 🍕 ali a d 🍕 a i a ra ce (a ୶ li g, gradi g, eighiq). Thie re ha areh e receir are accered a cllaeral frla.() Wareh е erefir e ablihedi rba area a dal g ai rad, a d be‰e l e ¢i he r ral area here agric I ral rel e are free e I rec rded. (i) The Za bia Agric Iral C di Age c L d a e abli hed i e a d re ke areh e lice ce, a d cerifad eree areh e ୶ erai . (ii) Acicai ra eg a de el ed ifr,ad gai he 🐢 r f,all akeh ldergr 🖌 iha 🖉 e iali ere i he abl, far er, rader, ør ce r, ba ker a dø lic - aker. 

A fJ e 2005, la fra al fUS\$2.18 illi had bee dibred rrald eller hr gh Za bia' areh e recei, e . H e er, he e i f he her he areh e recei, e del (b h i Za bia a d el e here) ca al be a, e, lied lie ck e, r d c eed be frherre ie ed a d a al ed.

Sources: C ler a d O ah, 2002; .ra e ece er. rg.

#### 3.2.4. Mobile banking

Mobile banking is a management strategy that allows financial institutions to reduce their fixed costs and operate in areas where it is not economically profitable to maintain a network of fixed bank windows. It consists of mobile offices – usually trucks – that visit remote rural areas for loan analysis, disbursement and collection on a regular basis (weekly or monthly), thereby expanding the geographical coverage of banking activities, with a relatively small increase in costs (Coetzee e  $a_{1}^{\prime}$ , 2003; Mallick, 2007; Opoku and Foy, 2008). Whether or not a commercial financial provider will decide to set up mobile banking services in rural areas will depend on the results of a cost-benefit analysis. Government policies and programmes, however, may reduce the costs or enhance the benefits of the cost-benefit ratio, thereby providing incentives for financial institutions to experiment with mobile banking delivery: • Public authorities should establish a legal, regulatory framework for financial institutions to operate in rural areas through a network of mobile banking offices. For

- Bureaucratic, rather than transport costs often constitute a major obstacle to poor people wishing to obtain loans. Unless the paper costs of securing loans, and of dealing with financial institutions in general, are reduced, mobile banking may not be the answer to providing financial services in rural areas.
- Policy-makers view mobile banking as a temporary measure for providing financial services in rural areas, typically in the aftermath of natural disasters such as in the earthquake-hit areas of Turkey in 1999 and Pakistan in 2005, rather than as a tool for establishing a functional financial market in rural areas (such as in Scotland).

#### Bo 26. MOBILE BANKS IN MALAWI

The Off r i I er a i al Ba k f Mala i (OIBM) fe ed i 2003 i h he a ed bjecie føridig fia cial erice heør. OIBMøerfr e fiøera i irral area hr gha bilebakig e rkc • ed f b lle • r fall- errai 4.4 ehicle. O e f he ehicle i a 5- e r ck fi ed i h a a a ed eller achi e (ATM), a c er bakiq affad fficie ∉acefradiiraie rk. The ehicle i e<sup>4</sup> i e e i h a lar∉a el,a∉ erge era r,agl bal∉ii ig e (GPS) rackig e adaellie ech I g ha all real-ie ra aci be ee he ehicle a d he ba k' head arer; i i al a e ded b ar ed fficer f he M bile P lice F rce. The her ehicle i a e 🔹 i fale (POS) ech l g erckha rec rd ra aci . The ehicle 3c er 26 er ice ∉ i i fie di ric a eekl bai, a d heir i i erar fll r ral arke da i de ig a ed illage. Fra all fee, ø røred le ha heb fare he eare , bak clie cadeøi e, acce heir a i gacc a da∉∉l fr all I a ar 🛉 relarge heirbie. La are all gie gr 🖸 fee e e ber (øri aril ø r), hereb i gøeerøre rea a bi efrc lla eral. I addii red ce heb rea cra ic b rde heørha a fehae fficial ide if d c -(bir h cer ifica e, ea e r r dri i g lice ce), OIBM er ide i clie i h a е ar card, called Mal i ch, hich ha fi gerøri e bedded i a chiø i hi he card a d ake check a clie ' ide i hr gh ca i g her/hi fi ger i 🔹 ible a ATM. Tha k i bile bak e rk, OIBM crreler e re ha 65 000 clie , he e 98 øerce f aj ri f h are e liigbel he 🐢 er li e; a erage,

all a are fill revaid. H e er, OIBM charge rela i el high i ere ra e; er ced re acce credi are c idered I, al beca e fha i g fe aff i he bile i; a d I a are di b r ed f r -agric I rali e e.

Sources: Mallick, 2007; .f rd.ør ca r. rg; . øø r i ca ada.ca.

#### 3.2.5. Branchle banking

Branchless banking is a business model that allows both financial and non-financial institutions to offer banking services in rural areas through non-bank agents, and thus at reduced operating costs. There are two main models of branchless banking. In the first, a licensed financial institution expands its services in rural areas through a non-bank retail agent, such as postal and retail outlets; in the second, a non-financial institution, such as a mobile network operator or a pre-paid card issuer, makes use of retail agents to offer customers e-money accounts. Both models make wide use of information and communication technologies, such as cell phones, debit and prepaid cards, and card readers to transmit transaction details between the customer, the retail agent and the institution providing the financial service (Donner and Tellez, 2008; Ivatury and Mas, 2008; Kumar  $e_a'$ ., 2006; Lyman  $e_a'$ ., 2006). An appropriate institutional framework should be put in place for branchless banking to develop, as follows:

- Non-bank actors, such as retail agents or post offices, should be legally entitled to perform certain financial operations on behalf of a licensed financial institution or a non-financial institution, such as a mobile network operator.
- Financial operations to be handled by non-bank actors should be clearly identified. These may involve simple operations, such as taking and disbursing cash, or more complex operations such as designing ad hoc financial products for customers.
- The responsibilities and liabilities of licensed financial institutions, non-financial institutions and retail agents should be defined and enforced in order to protect clients against misconduct.
- An effective information and communication technology platform should be set up because branchless banking can function properly only when transactions between customers, retail agents and banks, or issuers of non-bank e-money, can be recorded and communicated quickly, reliably and cheaply over vast distances.

Issues related to branchless banking include the following:

- Non-bank actors may be unable to handle cash transactions correctly, particularly when they involve more than the cash-in/cash-out functions of the typical bank teller, such as screening clients and disbursing loans.
- Non-bank actors in (remote) rural areas may not have enough cash to meet customers' withdrawal requests, both because of the seasonality of demand for credit (e.g. sowing season) and because an emergency (e.g. drought) may trigger requests for credit from most households in the regions affected.
- Branchless banking involves significant costs for training and supervision. This is because financial institutions must ensure that non-bank representatives behave correctly (misconduct involves not only administrative penalties but may also harm their reputation), and that loans are granted only following a thorough financial analysis.
- Problems of limited information, little or no education among the poor, high variability of agricultural risk, lack of collateral, etc. are not resolved through branchless banking. This limits the capacity of such a business model to serve the poor.
- Effective branchless banking requires that customers have access to, and knowledge of, communication technologies such as mobile phones and POS devices. The very poor, therefore, may not benefit from branchless banking models.

#### Bo 27. BANKING CORRESPONDENTS IN BRAZIL

O er he la fe ear, he Brazilia G er e ha bee a e ୶ i g f er i аi ade øerie ai i hebakig e ihaie icreaighe øøl ffiacial er ice hr gh hec r.l øar ic lar, i ce 2000, he Ce ral Ba k f Brazil ha all ed fia ciali i i rce heir ca h-i /ca had herf ci а arra fre ailage (e.g. ler kik, øhar acie a dø ffice) r ba kig crreø de . Thi ha crea ed ørecede ed øør i ie frbak ୶read heir 🖸 era i beca e r q i a d ric r le rki g h r a d alarie ha e al a ade i e∳e iefrbak øе e bra che i der 🐢 lied area. C rre 🐢 de are a fee-fr-erice bai: fre er e clie, e er ra aci ade, e er re era ed •r d c ld, he recei e a fee ha arie fr efia ciali i i her a d а c rre 🖸 de acc rdig I cai a der ice ør ided. M e POS de ice, bar c de reader a d/rke øad fr a agig fia cial ra aci . The rela i hiø be ee he crre ∉ de a dhefia ciali i arereg la edbheCiilCde:bakarefl liable f r heir age 'ac b are al all ed øerie heir raaci adrecrd, e acla if he ere der ake b bra ch ffice e el ee.

I 2000, f 5 800 icie ali ie i Brazil, 1 600 lacked acce fralbakiqerice; a heed f 2004, all icieali ie had acce fi a cial er ice hr gh 38 168 ba kigcrre∳ de .lidifficla e heher chcrre∳ de alerehe∳r. H e er, acc rdig he W rld Bak, 50 øerce f he clie f bakigc rreø de fCai a he ec d large Brazilia ba k ear le ha R\$200 øer h (US\$80); a d 60 erce f he clie fBac Pal hich a re<sup>4</sup> ired er ide ba ki g er ice icieali ie i h he are 🐢 r.

Sources: I a r a d Ma , 2008; K ar et al., 2006.

## 3.2.6. Member-ba ed financial in i ion

Member-based institutions, such as cooperatives, village banks, SHGs and ROSCAs, may well be a compelling, low-cost option for extending financial services to poor, rural and remote areas. Either a licensed financial institution lends to farmer groups/associations, or the farmers themselves establish a ROSCA/village bank to facilitate the redistribution of local savings and promote local investments. Ultimately, because member-based institutions minimize screening and monitoring costs in financial markets, members have an incentive to check on one another and exclude risky borrowers from participation. The need for collateral is reduced as the group is held responsible for repayment (Chao-Béroff  $e_a'$ , 2000; Grant and Coetzee, 2005; Paxton and Cuevas, 2002). A government may support the establishment of member-based financial institutions, both directly and indirectly.

 Member-based financial institutions, such as SHGs or village banks, should be granted legal status. This would make it possible for them either to be recognized as interlocutors for financial banks or to provide a variety of financial services themselves. • Rural dwellers should receive training in group and financial management, including peer group pressure (with loans extended first to one member of the group and then to others, based on satisfactory repayment by the first borrower); on the ramby developls9lynamic a

## Bo 28. VILLAGE BANKS IN MALI

The a eed Na i al Agric I ral De el 🖌 e Ba k (Banque national de développement agricole, BNDA) f Maliha e er bee i a 🐢 ii 🛛 🐢 🏟 a i g a d l a 🛛 ail red he eed f allh lder liigire erralregi . I he id-1980, Ger a Fia cial a d Tech ical C 🛛 🖌 🖌 era i red he e abli h e f l cal elf-ad i i ered illage a i g a d credi ba k (Caisses villageoises d'épargne et de crédit autogerées - CVECAs) ih he bjecie fheløig illager bilize heir a ig a d b ai acce credi frøTadc 1r cce : (Ger a )-01((C øera i )-01(ai øT )(ed )-01(( he )-01((c ceø e )-01(( f)-01(( illage 1øa iciøac a d BND e eagei g ce f r le di g l cal a i er era1 (f)-7(30f)-7(()-7(40f)-7(er(ce .f)-7(CTilra1 ral)-)7(f)-7(er id(ed)-78b)-78 cial)ir, he Iraeril deig all li ck, aed far ei GVECAe ea e 20 regi 🖸 f Mali 🖉 era i al. 🖉 ac 🛛 r ed rd a f bgere, i.e., abh 70 øer(ce)-5((f)-55(al)-55e(c icaøl)-55(ecie)-55(illager)-55had)-55(ecce

## 3.2.7. Credi b rea and coring

The lack of, or limited, information about smallholders' capacity to make profitable investments and repay their loans constitutes a major constraint on the supply of credit by financial institutions. Credit bureaus are public or private firms that build up large databases on financial transactions by individuals, farms and firms. Such databases also provide an incentive to borrowers to repay their loans, because reputations (as good borrowers) are turned into collateral and even temporary breaches of a lending contract are made public. Credit bureaus could thus serve as an effective mechanism for sustaining financial markets (BASIS, 2003; Campion and Valuenzela, 2001; Miller 2003). Some reports indicate that 49 percent of small firms report credit constraints in countries without credit bureaus, compared with 27 percent in countries that have them (Rozycki, 2006). The public sector has a role to play in establishing credit bureaus:



- Such bureaus should be legally recognized concerns, i.e. institutions allowed to collect and process a variety of data emanating from regulated and unregulated financial institutions (banks, NGOs, etc.).
- Credit bureaus should be allowed either to collect only basic data on potential borrowers (e.g. name, address, gender, etc.) and their past credit transactions (e.g. unpaid loans, blacklisted clients), or to seek more detailed information such as employment status, average income, use of checking, savings and deposit accounts, etc. A trade-off exists between consumer protection (privacy, data accuracy and use) and the effectiveness of credit bureaus as a tool to support financial markets.
- Credit bureaus should be allowed to process and disclose the private information they
  obtain from regulated/unregulated financial institutions. These data are typically used
  to build so-called credit scorings, i.e. values providing an indication of the repayment
  capacity of single or group clients. In general, the information thereby processed is
  sold to financial institutions in order to ensure the self-sustainability of credit bureaus.

Establishing effective credit bureaus that help financial institutions serve (poor) rural households is anything but straightforward:

- As smallholders often obtain loans through group lending, it is often difficult to obtain information on each potential borrower and build up individual credit scores.
- The majority of rural dwellers have no regular transactions with financial institutions and do not pay income tax or possess an identity card. Crucial pieces of information to screen clients are therefore missing, and seeking different risk indicators to build credit scorings – such as agricultural productivity, membership in farmer organizations
  - is a costly undertaking.

- Unregulated financial institutions (e.g. NGOs), which provide a large amount of credit in rural areas, rarely gather and process information in a form that could be used by credit bureaus.
- A large share of the demand for credit in rural areas is for short-term investments, whereas credit scorings are only appropriate for assessing the long-term repayment capacity of prospective borrowers.
- Financial institutions operating in rural areas take it for granted that potential clients will rarely be mentioned in credit bureau reports; they are therefore unwilling to pay a fee for access to such reports.

#### Bo 29. CREDIT BUREAUS IN PERU

Sice he ar fi era i i 1962, he Per ia P blic Credi B rea ha radi i all clleced, ørce ed addiribed i frai clie ihla a e ceedi q he e®iale fUS\$4500. Thilii a e red cedela i ør ce ig heifrai, hich a d e a all. I 1998, i h 🐢 r fr he I er-A erica De el 🐢 e Bak, he Gere fPer creaeda e fd al credibrea : e fr Ia fre ha US\$4500, a d e f r l a f le ha ha a . A ha i e, here ere 170000 reqierfrla ferUS\$4500 ad reha2 illi frla fle, adi a f d ha а all la clie had baied 💉 eigh la agai he a e c lla eral. The øree iaiihaq er e reaic rlfhecredibreaihecae fla e ceedi g US\$4 500, herea he a age e / øda i g f he da aba e aller I a rced a da a er ce i g fir . Credi b rea da a are a ailable ha bee he l ere, a d fiacialii i caacce heifrai igac dead ୶ rd. Wih he Id e i a, e ialbrr er; he e k hree h bai a reer e ha a i e-lag f l 23 da . I er e -ba ed

Si ce he d al credi b rea e ha bee i ¢lace, re<sup>16</sup> e f r i f r a i ( credi ra i g, refi a ci g, j dicial ¢r ceedi g, c lla eral, e c.) ha e i crea ed fr 400 6 000 i <sup>16</sup> irie ¢er h. B earl 1999, 51 f 66 reg la ed fi a cial i i ere re¢r r i g he credi b rea a d i a ¢la ed e ¢r a her 15 h r l hereaf er.

Source: Ca 🕡 a d Val e zela, 2001.

#### **3.3. MARKETING POLICIES AND PROGRAMMES**

In much of the developing world, the reasons why livestock markets function badly have to do with poor communication and transport infrastructure, lack of or limited information, unequal bargaining power among contracting parties, imperfect contract monitoring and enforcement, limited access to finance, etc. Failures and imperfections reduce the capacity of markets to indicate how livestock producers should best allocate their productive resources, thus constituting a net loss for society. For instance, a lack of information on distant markets that could absorb excess local supply will reduce incentives for livestock keepers to adopt productivity-enhancing technology because increased production would only lead to lower prices on local markets. (Key  $e_a a'_{..}$ , 2000; Jabbar  $e_a'_{..}$ , 2008). There

are thus good reasons why governments should formulate and implement policies/programmes that boost market functioning.

Government interventions to promote market functioning have long consisted in controlling the price of major staples and cash crops – such as through administrative price

## 3.3.1. Li e ock rader a ocia ion

Associations of livestock traders are private entities that facilitate the trading of livestock and livestock products by collecting and disseminating market information among members (and non-members) for a (membership) fee. Information on production levels, market prices, quality standards, road conditions, etc. enables traders to identify areas of surplus/ deficit (i.e. profit opportunities) without embarking on expensive search procedures. At the same time, by fostering competition among traders, information is expected to benefit both producers and consumers. However, market imperfections that disproportionately benefit certain traders (for instance, those with privileged access to some markets) and the high transaction costs of collective actions act as strong disincentives for traders both to establish associations and to cooperate among themselves (Lyon, 2003; Rademakers, 2000; Shepherd, 2005). There are thus rationales for government to support and sustain trader associations. Such policies/programmes call for the following:

- An assessment of potential regional/national markets for livestock and livestock products, i.e. examining whether it would be worthwhile for traders to set up associations for aggregating supply and demand in different areas and at different times.
- Provision of incentives for (livestock) traders to set up associations, with government avoiding the forced establishment of state-driven organizations. Such incentives might include the provision/dissemination of information on regional/national markets, technical and management assistance, grants/loans at preferential rates to cover start-up costs, etc.
- In some cases, it may be possible to forge public-private partnerships with trader associations. For instance, in addition to providing information on prices and training for members in handling and storage, associations may be requested to run public markets – such as cleaning and guarding marketplaces, or even owning and operating the markets themselves.
- As local trader associations find it difficult to obtain information on more distant markets, governments may also support so-called umbrella organizations to guide and represent them. Provided they are given adequate space and voice in the policy process, umbrella organizations may well be important interlocutors and act as a source of information for governments in formulating livestock sector policies.

Trader associations can certainly contribute to better marketing of livestock and livestock products. However:

- their membership is usually limited to medium to large traders as the relatively high direct/indirect costs exclude the small and part-time traders (most associations require members to pay relatively high membership fees; others accept only traders with a government licence); large traders, in turn, prefer to deal with a few large-scale producers rather than with many small livestock farmers; this generates few benefits for smallholder producers;
- even when associations represent a wide spectrum of livestock traders, the larger ones tend to take over and use them to further their own interests rather than those of all members;
- unless traders are trained to set up and run their associations, there is little chance they will function properly and be sustainable;

- in some areas, trader associations draw on traditional chieftaincy structures, which
  may lead to the exclusion of some traders on the basis of ethnic and religious affiliations, for instance;
- if only a few trader associations are established, they may assume a cartel-like behaviour at the local, regional and even national levels, thereby reducing competition on livestock markets; in other words, traders may agree on matters such as price-fixing, distribution of products between different markets, etc. to their own advantage;
- the economic and social returns to trader associations are difficult to quantity; policymakers therefore tend to look on them only as a source of revenue (through taxation) rather than as a tool for improving market functioning; in effect, trader associations are rarely represented on government committees; they are rarely consulted and do not actively participate in any policy-making process.

## Bo 30. UGANDA'S NATIONAL DAIRY TRADERS ASSOCIATION

Li i ed held he The a e-r Dair C re ra i I frheclleci a d ale f ilki Uga da il 1992, he he dair ec r a liberalized a d e eral all- cale ilk rader bega øera ei he arke. I hefllig ear, he ec re leda largel reglaedadhere alile r ∿alic rl, ih∳e ialrik blic heal h. I 1998, herefre, he Gere f Uga da ୶ a ed he Dair I dr Ac, hich e abli hed he Dair De el 🖸 e 🗛 h ri (DDA) re 🌮 ible frreg la i g he dair arke, a dard a d c r l. S all rader, e la e¢eciallier feig⊌ali era rad dhe eleicreaigl r cer, heer, f able c ୶ 🛛 ih he 🧌 ali a dard frilka ddair ୶ rd ce b DDA. Frha rea , i 1999, he Uga da Na i al Dair Trader A cia i (UNDATA) a e abli hed, ai l reøre e hei ere f he ifral ilk arke i gecra dfall ørce r(ilk bili ga dcler øera r). UNDATA' ilk a d dair 🖝 derall i i i c ihi hec r

B raiiqi e ber bjec relaig he ali a d afe ha dli g f ilk, UNDATA ha c i ced a all rader carr ilk i h gie ic e al ca i ead f -f d-grade ela ic jerr ca . Trader elli g ra ilk di øla icker ad i i g b er b il ilk bef re c al a ah icreae he ale fli•id ilkb ad øig re øhiicaed ech lgie, chabach 📭 a erizai , fer e ai adc lig, hich al icreae he afe filk. UNDATA e ablihig ilk 🖲 ali a dard, i la i g ha all ilk ha dled b i i – e ber h ld ୶ a hr gh a c ld-rage chai. T da , he a cia i ha ab 1000 e ber ha dlig re ha 300 000 lire filk øer da.

Sources: Dairy Mail Africa, 2007a; 2007b; .dda. r. g.

## 3.3.2. Li e ock broker or commi ion agen

Livestock brokers or commission agents act as "middlemen to the middlemen" (Gabre-Madhin, 2001) linking traders and buyers. As a general rule, they provide information to traders on demand and supply trends (price) in distant markets; help traders find buyers; carry out buying/selling activities on behalf of traders; provide guarantees on the quality of products; and give formal and informal advice for the enforcement of contracts. Brokers charge a fixed fee – they rarely take a margin on the value of the transaction – in order to reduce their trading risks (Gabre-Madhin, 2001; Hill, 1966; Mulugeta  $e_a'$ , 2007). In industrialized countries where livestock markets are highly developed, such as Canada, New Zealand and the United States, brokerage is regulated in terms of details, whereas it remains largely unregulated in the developing world. In some developing countries, however, establishing a legal framework for brokerage activities would facilitate the marketing of livestock and livestock products. This would call for the following:

- Legal recognition of brokers or commission agents, and a system of licences that guarantee the trustworthiness of brokers.
- Rules and regulations governing the relationships between brokers, traders and buyers. Contracting parties are expected to define the details of each contract themselves (e.g. some brokers may only advise traders on the buying and selling of animals, while others may also arrange transport to distant markets). But traders' and brokers' responsibilities should be defined e a e to reduce the possibility of misunderstandings and/or misconduct.
- Rapid dispute-settlement mechanisms to solve differences between commission agents, traders and buyers. It should be noted, however, that in some cases brokers also help enforce informal market rules by monitoring transactions, assuring the integrity of each party in the transaction, and guaranteeing that the negotiated price is paid.
- Whereas commission agents do not require significant working capital, governments may wish to provide them with financial support to start up their business concerns. The Punjab National Bank of India, for instance, gives preferential loans to dealers engaged in distributing cattle, feed, poultry feed, dairy feed, etc. (www.pnbindia. com); in other cases, brokers are paid for collecting marketing fees or documenting market transactions.

It is not certain whether public authorities in developing countries are capable of effectively promoting brokerage activities to facilitate the functioning of livestock markets:

- It may be difficult for public authorities to regulate and enforce brokerage activities, both because of limited institutional capacity and because – in underdeveloped rural settings – commission agents/brokers provide a variety of service to traders (e.g. transport services and extension of loans), many of which are already governed by a variety of laws and regulations.
- Brokerage may not be financially profitable, particularly when there are limited market
  opportunities for traders to sell livestock and livestock products at a profit on distant
  markets (e.g. low demand; poor transportation networks; strong local competitors).
- Commission agents may be tempted to collude in 'squeezing' the profits of livestock traders, with negative repercussions on both producers and consumers. In addition, it

is both institutionally demanding and costly for public authorities to create competition among brokers, such as through providing market information to the public at large.

• Owing to limited communication infrastructure, 00 1 Tf-1 407400nd to provide services only



a weekly or fortnightly basis or at other regular intervals, represent a viable alternative for farmers both to save transaction costs and to market their livestock and livestock products. These markets are quite common in rural areas and, in terms of numbers of participants, are often the largest component of the overall marketing system in developing countries (Konaka, 1997; Mozambique, Government of, 2003; Mukerji, 1988). Whereas they largely generate private benefits, public support is often needed to establish periodic markets because of the public goods nature of marketplaces. This calls for the following:

- An assessment of the opportunities for sustainable periodic markets to develop, i.e. an analysis of potential demand for and supply of livestock and livestock products in a given area/region.
- Identification of villages/towns where basic physical infrastructure is needed for a periodic market. Fences, water tanks for livestock, animal health posts, etc. are goods/services that the public sector is expected to contribute.
- The public sector central or local government is responsible, or should entrust private actors with responsibility, for running marketplaces, including cleaning and protection, maintaining basic infrastructure, charging fees to users, etc.
- Government may sustain periodic markets by supplying public goods on market days (e.g. animal vaccination/extension services). In general, the more products/services available at periodic markets, the higher their sustainability (more people participate in market exchanges).

Periodic markets facilitate the aggregation of local demand for and supply of livestock and livestock products. However, they also face challenges:

- Periodic markets are location-specific and do not contribute to overall market functioning, and are therefore very much affected by local trends. Price variations are typically greater in periodic than in major daily markets.
- Periodic markets are often dominated by local commercial interests, e.g. few buyers

or few sellers, which could reduce the efficiency gains associated with lower transaction costs for market participants.

- Despite the smaller concentration of animals in periodic as opposed to daily markets, the unit cost of an animal health surveillance system is higher in periodic markets because of economies of scale in the provision of public goods. This acts as a strong disincentive for policy-makers to favour the establishment of (relatively small) periodic livestock markets.
- Local authorities/farmers may be unable properly to manage market infrastructure, and/or the revenue generated by a limited number of participants/transactions may make the cost of maintaining market infrastructure unbearably high.

## Bo 32. SAMBURU LIVESTOCK MARKET IN KENYA

e f he 18 di ric ha ake 🖝 he Rif Valle Pr i ce f r her Sabr Diric, Ke a, i charac erized b a har h, arid a d e i-arid cli a e, cr bla d a d li i ed rai fall. fSabrareei-The i habi a adicea rali h e radii aler d ci ech I gie a d ha e li le acce arke f r heir li e ck. I 1991, he fir øeri dic lie ckarke i rher Kea a ୶ e ed i he fSg a Marar he her edge fSa br Diric. The arke i held e er eek,adab 1000 b er 2000 head flie ck. Sa br e ele earicia d eller øar iciøa e, e cha gi g ab ୶ a e i he arke al e irel a eller raher ha a b er, a re- cki g i achie ed b breedig heira i al raher ha b 🕐 rchaig he . Lie cki all • rcha ed b largeber, hra ør i ciie blrr.The c farke i glie cki Saga Mar ar differ, deee di g he her large r all ck are e cha ged: he a erage arke i K h. 42.5 er head f all ck a d K h. 250 er head f ca le; ra 🖸 r c he a erage c cil fee i Kh. 36 a d Kh. 50, re øec i el . O erall, he e ra ac i c 9 a d 4 øerce free efr all ckad large ck, reøeciel. frab acc e, hich e re ha all ୶ ar ici୶ a Marke ørice are e b a a c i recei e he a eifrai ab 

The Sabreridic arkefciell, a de raedb hegr ig ber f lie ck far er hrek heira i al he di ric fr her regi beca e he are c fide f ge i g he be e ible erice here. The arke al he li elih d ## r føa raløe øle, øar ic larl a i all c er heirlie cki ca h, hereb he i egra i g he ୶ a ral е i he arke ec adfrhebeer.

Source: K aka, 1997.

## 3.3.4. Marke ed-orien ed farmer a ocia ion

Farmer organizations can help reduce transaction costs and facilitate trading of livestock and livestock products. They allow members to bulk-up their produce for sale, reduce unitary transport costs, increase their bargaining power and fetch better prices. In some cases, they also help farmers gain access to financial services (FAO, 2009; Holloway e a'., 1999; Uotila and Dhanapala, 1994). Farmer organizations produce private benefits. However, given the high cost of collective action for (small) farmers to set up associations and the overall benefits that efficient markets generate for society, government may consider sup-

 Farmer organizations, particularly those with small farmers among their membership, usually provide a variety of services to farmers, including financial assistance, technical advice and marketing support. Providing support to smallholder farmer associations,

## 3.3.5. Con rac farming

Contract farming involves arrangements whereby commercial processors/wholesalers/retailers purchase the right to buy some or all of a farmer's production at a predetermined price, and provide farmers with production-related services. The range of services to farmers varies widely (e.g. credit, feed, technical assistance, etc.), as do the terms of the produce-purchase contracts (quantity, price, quality premiums). Arrangements may be bipartite (only one company provides all services) or involve relations among multiple service providers delivering input, finance, extension and marketing services to farmers (Catelos and Costales, 2008; Costales  $e_{a_i}^{I}$ , 2006; Eaton and Shepherd, 2001). While contract farming pertains to the private-sector domain, governments may consider designing programmes/ policies that favour contract farming schemes, with the objective of promoting inclusive agricultural growth. Possible actions by public authorities include the following:

- Reducing search and screening costs for both contracting parties, e.g. through licensing/creation of a freely accessible database of reliable producers, processors and other relevant actors.
- Limiting the paper costs of negotiating contracts, including fixed and variable costs. For instance, public authorities could reduce fees on contract registration and/or define, in consultation with relevant stakeholder groups, standard types of contracts that parties may agree to.
- Creating a level playing field for contracting parties, bearing in mind that small farmers are often in a weaker bargaining position \\ *i* ∂ \\ *i* large processors/wholesalers/ retailers. For instance, laws could stipulate the major responsibilities/obligations of contracting parties; market prices could be posted publicly; and extension workers might also train farmers in marketing and contracting strategies.
- Designing a regulatory framework to avoid creating monopsonies by large processors or monopolies by groups of farmers. In other words, smallholder assets should not be a source of 'quasi-rent' for large processors and come to have low salvage value outside the bilateral contractual relationship. At the same time, smallholders should not unduly 'squeeze' the profitability of processors/wholesalers/retailers.
- Whereas an efficient, equitable judicial system is a key component of any enabling business environment, government may establish rapid, low-cost dispute-settlement mechanisms for parties involved in contract farming schemes.

Contract farming offers wide scope for giving resource-poor farmers more access to markets. However, there are challenges:

- Large processing and other firms tend to discriminate against small producers for a number of reasons, including lack of collateral and higher transaction costs when dealing with many small farmers rather than with a few larger ones, etc. In other words, contract farming does not always effectively promote inclusive growth of agriculture.
- Many smallholders live outside the formal economy and cannot or can rarely deal with formal large processors, wholesalers and other actors.
- Limited availability of financial and human resources within government makes it difficult to establish (and enforce) a legal institutional framework to ensure equitable

contracting. The outcome of contract farming, in terms of distribution levels, thus remains a topic open to debate and controversy.

 Contract-growing arrangements have been largely implemented for plantation crops and some staples, and have only recently been expanded to livestock products, particularly dairy and poultry. There is thus limited, if not inconsistent, information about how pro-poor contract-growing arrangements for livestock products should be designed and implemented.

#### Bo 34. PRO-POOR CONTRACT POULTRY FARMING IN MALAYSIA

A • ar fabraderai al raeq eradica e 🗸 er , rai e r rali c e a d de el 🗸 I cale reere e r hie, he Sara ak Ec ic De el 🗸 e 🛛 C r 🗸 ra i (SEDC) ha, i ce 1998. 🐢 red 🐢 Ir far ig c rac i lig Da ak far er, a argialized e hic gr 🕐 aie he i eri r f B r e . U der he che e, i ere ed far er (aged 18 45 ear) are regimented concerned and earlier and the earlier of the regimentation of the earlier of hich SEDC elec ear iciea f ra rial øha e. The far er hereb eleced: (i) are rai ed i brilerheal haage e, dieae øre e i , chicke la gherigad ør ce ig, a de erørie a age e a d b kkeeøi g; (ii) øar iciøa e i hree r f r rial here he rai e br iler der c rac SEDC, hich ell he a bidiar øøl i g chicke direc l с r lled a e le, i cl di g ch l, h ୶ i al a d ar ba e ; d ri g each rial, far er are e ec ed 400 da - ld chick a ri ab 300 er a 45-da c cle, i h a acceø able rear rali rae f7 erce ; a d (iii) SEDC e e d credi far er ee he c fb ildi q hed øecified a dard, hiri glab ra dørcha i ge@iø e

E ide ce da e gge ha he er d cii f c raced far er ha i er ed: I r far er e aricie a i g i he che e ha e ree r ed e gai i heir realic e. The che e ree ree e f he fe e blic-ec r a e e rai er ralic e hr gh c rac far i g, hereb de ra i g ha c rac far i g per se d e di cri i a e agai allh lder. I al ake i e ible f r he e blic ec r i crea e ree e, hich SEDC rei e f r r ral de el e e i he Sara ak regi.

Source: M rri et al., 2006.

#### 3.3.6. Marke informa ion em

Market information systems (MISs) aim to provide farmers, traders and other actors along the supply chain with short-term information on price levels (to guide marketing decisions) and medium-/long-term information on market trends (to guide investment decisions). Information is the key element of any MIS and, since market information is a public good, some degree of public-sector intervention is needed to set up and maintain a system of information collection, analysis and dissemination (CTA, 2005; Shepherd, 1998; www. agmarknet.nic.in). Support for the establishment of MISs calls for the following:

 Selecting products/commodities to be included in MISs. As few farmers are specialized producers, and those who are specialized have their own sources of information.
 MISs should generally cover a variety of commodities to guide decisions on purchases/ sales and help farmers programme their investments.

- Selecting area coverage, because MISs can cover local, regional, national and even international markets. The wider the area coverage, the more livestock farmers can be guided in their marketing and investment decisions. There is, however, a trade-off between the costs and benefits of establishing wide-scope MISs, because the majority of livestock farmers sell their produce on local or regional markets only.
- Establishing mechanisms for collecting information. This includes identifying and contracting different sources of information, such as public officers, producers, traders, wholesalers and other public and private stakeholders along the supply chain.
- Setting up a system for data analysis and the dissemination of information. At the simplest level, data can remain unprocessed and posted on notice boards in major markets; more or less sophisticated statistical analyses can also be performed, and information disseminated through a variety of means such as FM radios, mobile phones and satellites. There is a trade-off between data analysis and the speed at which information is disseminated, which is crucial for guiding marketing and investment decisions.

Common issues associated with MISs include the following:

- Establishing and maintaining an MIS is costly. Financing options include not only taxpayers' money but also cost-recovery mechanisms – such as levies or fees charged to users – because farmers are expected to receive private benefits from the information collated/disseminated.
- MISs tend to focus on a limited number of agricultural products because budget and institutional constraints prevent governments from collecting, analysing and disseminating information on several commodities. This greatly reduces the systems' impact on farming and marketing decisions.
- MISs rarely disseminate timely information to guide marketing and investment

decisions. Typically, MISs publicize monthly price averages per commodity/market, whereas weekly or daily information on price levels would enable smallholders/traders to take appropriate marketing and investment decisions.

•

## 3.3.7. Commodi e change

Commodity exchanges are places where trade, with or without physical commodities, is facilitated through a low-cost system of 'price discovery' (usually bidding) and an agreed set of rules on produce quality, agents' conduct and contract details. Commodity exchanges help to make market transactions both rapid and low-cost, including on-the-spot and derivative transactions, thereby reducing transaction costs and benefiting buyers and sellers directly. They can be established by the public and private sectors alike, although government remains responsible at all times for regulatory and supervisory activities (Gog-ging, 2007; Okolla, 2002; USAID, 2007a). Establishing a functional agricultural commodity exchange requires the following:

- A large, or potentially large, market is needed for agricultural goods, including livestock products, to ensure that the volume of agricultural products sold/bought is sufficient to justify public investments in the commodity exchange.
- A system of commodity grading and specification is needed. This system should include descriptions of a standard or base variety for each product, which represents the unit of exchange for sellers and buyers. Licensed inspectors would be expected regularly to verify the accuracy of grading and certification.
- To stimulate competition among buyers and sellers (thereby ensuring market transparency and reduced marketing transaction costs), the commodity exchange should adopt a system of price discovery, such as bulletin boards where bids and offers are posted, or an 'open outcry' system whereby market actors call out their bids and orders.
- To facilitate transactions, public authorities could define, in collaboration with stakeholders, the terms and conditions of standard contracts to be adopted on the exchange. Such contracts should include, as a minimum, details on quantity and quality of the commodity, price, delivery date, names of parties involved, consequences of non-performance, etc.
- As it is not feasible for all farmers to participate directly in commodity exchanges, the latter are usually dominated by brokers whose (minimum) duties and rights should be specified by public authorities. Brokers are responsible for trading on behalf of an unlimited number of buyers and sellers and pay a fee to participate in the exchange, which may be associated with the number or value of transactions performed.
- Rules, codes and procedures should be defined for contract enforcement and dispute settlements, which are critical for creating the necessary trust that enables a market to work efficiently.

Commodity exchanges are an attractive policy option to facilitate the functioning of agricultural markets. However they face challenges:

- In several developing countries there are not enough large-scale sellers and/or buyers of agricultural commodities – including livestock products – for a commodity exchange to function profitably.
- Small livestock producers would rarely be able to benefit from a commodity exchange: first of all, they are unable to comply with the quality/grading standards established by the exchange; second, given their limited agricultural surplus, they will

participate in the exchange only if they are members of large marketing cooperatives.

- It is a challenging task to define and enforce low-cost mechanisms that unambiguously define and assess the grade, weight and quality of the unprocessed livestock products dominating markets in developing countries.
- Commodity exchanges work through brokers. However, in a few developing countries, brokerage is a well-established institution, and intermediaries have a bad reputation in most of them. In addition, brokers may oppose an institutional mechanism aimed at increasing market transparency, including commodity exchanges.
- Commodity exchanges often build on existing warehouse receipt systems, although such systems operate in only a few developing countries. Warehouse receipts – certifying the deposit of goods in the warehouse, as well as their quantity and quality – can be used both as collateral for loans and for trading on commodity exchanges.

## Bo 36. ZAMBIA AGRICULTURAL COMMODITY EXCHANGE

The Za bia Agric I re C di ie E cha ge (ZAMACE) e abli hed i Ma 2007 i h he 🐢 r fUSDA i a eria e i i ha eride b er/eller fagric I rala d -agric I ralg d i ha ra øare e cha ge echa i . ZAMACE i ed b i e ber, br ker h ha e b gh ea hee chagead reeree 11 ajrii-/ rɑa iza i i Za bia, ch a he Miller A cia i f Za bia, he Grai Trader Α cia i f Za bia, a d he Za bia Na i al Far er U i . Me ber ha e 🖉 ecified he e cha ge; r le a clear e f a dard fr he aj ragric l ral ør d c raded gara ee ec ri f ra aci ; a da arbira i е le 🕐 ible di 🖌 e . i i O he e cha ge, rader ake heir bid hr gh br ker h ake a c f 0.15 erce he ale fra aci, fr b h he b er a d eller. There i fficial i i he 🛯 a i fa di raded b , i @rac ice, 30 е с e i he i i . ZAMACE i al li ked he Mala i Agric I ral C di E cha ge, hereb giigi e ber acce regi al arke .

i Za bia. I ZAMACE er ide al able er fr arke ra ac i he fir i. h f erai , i rec rded ra aci al ed a er US\$8.1 illi , al h gh all far er ha e I argiall be efied beca e i i ell all Ie førd cehr ghhee chage. A ber feil er jec ha e bee la ched hele he e l heir agric l ral c di ie a d rade he hee cha gea a gr . H e er, he G er e reg larl i er e e agric l ral arke , hereb c rai i q arke f ci a dred ci g he effeci e e f ZAMACE. F ri a ce, i 2008, e 🗸 r faize ereba edire e a 40 øerce drøiørd ci drig he 2007/2008 far ig ea

Sources: USAID, 2007a; .za ace.c .

## 3.4. LIVESTOCK TRADE POLICIES AND PROGRAMMES

Reduced barriers to trade and increased economic integration among countries create opportunities for livestock sector development. But they also generate risks associated with transboundary animal diseases and other negative externalities related to public health and the environment. The objective of livestock trade policies is to maximize, for each country, the net benefits from livestock trade, by either importing or exporting livestock and livestock products.

International/regional trade in livestock and livestock products is primarily affected by tariff and non-tariff policy measures. The former modulate imports/exports through a variety of monetary instruments, such as import duties, export subsidies and border fees, levies and charges. The latter make use of non-price instruments to regulate trade movements, such as quantitative restrictions (e.g. import quotas), contingency measures (e.g. antidumping measures), technical requirements (e.g. certification procedures) and sanitary and phytosanitary standards (SPSs) (Morrison and Sarris, 2007; www.wto.org)

Acknowledging that, in whatever form, unjustified barriers to trade generate net economic losses, the 153 members (as of August 2008) of the World Trade Organization (WTO) have agreed to facilitate international trade – including trade in agriculture and, within agriculture, in livestock and livestock products – via the reduction/elimination of all forms of trade-distorting policies such as export subsidies, import tariffs, domestic support or production subsidies, although they recognize that economic and social rationales may justify some form of temporary support for national producers and markets. Negotiations among WTO member countries began in early 2000 on ways of removing barriers to trade in agricultural products, but agreement has still to be reached on the so-called 'modalities'. Agreement on modalities will determine the scale of tariff reductions for a variety of agricultural products as well as future levels of subsidies to agriculture in WTO member countries (Anderson and Martin, 2006; www.wto.org).

In 1995, WTO member countries ratified the Sanitary and Phytosanitary Agreement. This allows member countries to set their own sanitary standards provided they are based on science, or simply to base their sanitary requirements on international standards, guidelines and recommendations. WTO recognizes the World Organisation for Animal Health (OIE) as responsible for the development and promotion of international animal health standards, guidelines and recommendations for live animals and livestock products. OIE standards and recommendations are used as a permanent reference for SPS livestock measures in the majority of WTO member countries (Peterson and Orden, 2005; www.oie.int).

Overall, the prospects for increased integration of livestock markets appear good. However, as livestock are marginally traded by the majority of the world's countries, and as developing countries are often unable to have a voice in international fora, it is difficult for them to influence international trade rules and regulations affecting livestock. Nevertheless, livestock departments/ministries in developing countries retain a certain degree of freedom to design and formulate policies/programmes, mainly national-level, that facilitate trade in livestock and animal products. What follows reviews some of the major trade policy measures that affect livestock sector development, including measures designed and implemented by a livestock department.

# 3.4.1. E por ppor mea re

The objective of introducing export support measures for livestock and livestock products is to make them competitive on international markets while minimizing the risks of over-

In effect, by ensuring a minimum level of remuneration for livestock farmers, such measures reduce their incentives to invest in efficiency-enhancing technologies.

- It might be difficult for policy-makers to withdraw export support measures, not only because of beneficiary opposition but also because of possible negative consequences for society as a whole, such as increased unemployment.
- Export support measures may result in a net loss for society, as they could reduce the availability of animals and animal products on national markets and keep prices high for consumers.
- The overall cost of export support measures over the years is often uncertain, as this depends on changes beyond the direct control of government. These relate, among other things, to prices on international markets; input prices (e.g. feed, labour); the response of trade partners/competitors; and changes in SPSs.
- Export promotion measures may lead to inflation, because employees in the sector may demand wage increases that are not commensurate with any increases in labour productivity.

## Bo 37. PIGMEAT EXPORT SUBSIDIES IN THE EUROPEAN UNION

Prkeør fr he Er øea Ui (EU) ha e grad all I heirc ∉eiiee i ce 2000 ig deerirai fheer/UiedSaedllarechageraehafa rdllar-baed rldørkørd cer. Thil i eør cøeiiee, cøled ihicreaed i 🛉 r , ha ge era ed a 🛛 er 🐢 l f 🕫 ea i hi he EU. I Oc ber 2007, heref re, i i r d ced he PriaeS rage Aid Schee, he E r 🖊 ea C der hich a c i. b id a ୶ rided lie ck øera r illig re øig ea fraøerid e 🐢 e a d ri k. Thi h a heir bid a i e ded f hree fi e c er a de able ∉era r arke heir ea a a la er da e, he erice had rage c rec ered. I Dece ber 2007, h e er, he EU dic i ed he che e a arelica i had e li i fr hich f d ere a ailable a d beca e arke erice reached he 100 000 i ør ed a e øec ed. (Frher re, feed ørice had i crea ed e e h gh, i had N e ber 2007, he EU lifed all d ie cereali 🐢 r .) The EU be 🖲 e l i r d ced der hich øig far er h had øre i l aøølied frøria e ee r ea re e 🖌 r rage aid ere e i led recei e a e ∉ r b id f€ 31.10/100 kg f r ∉ rk carca e 25 øerce f he øre aili g EU a erage ø rk carca ørice. ig ab adc,a The EU 🐢 rk e 🐢 r 🛛 b idie , hich led a c ∉lai fr 🔹 rk ୶ r d cer i he Uied Sae, Caadaad Aralia, ere re edi Ag 2008 he he erice f eig carca e had i crea ed a d feed ørice ere falli g. H e er, he high c f feed, a d i ge eral, c bi ed i h ricere ir e al reg la i , led fall i 🐢 ega i e re r he EU 🗸 rkid ri 2008.

Source: EU, 2007; . heeig i e.c .

#### 3.4.2. Impor re ric ion mea re

The objective of import restrictions, such as tariffs and quotas, is to limit the participation of foreign companies on national markets. They also aim to stimulate national livestock systems by temporarily protecting the sector from international competition. Import tariffs, usually levied at the border, may be specific and/or ad||a|' ;e , depending on whether they are levied as a fixed charge or as a proportion of the value of the commodity imported; two-part tariffs, including both a specific and an ad||a|' ;e component, may also be levied. Import quotas impose a ceiling on imports of certain products. However, under the terms of WTO agreements, almost all import restrictions that were not in the form of tariffs, including quotas, have been converted to tariffs – a process known as tariffication – and the new rule for market access in agricultural products is 'tariffs only' (Anderson and Martin, 2006; www.wto.org). The design and implementation of import restriction measures calls for the following:

- Identifying livestock subsectors/products that might develop as a result of import restriction measures, including an assessment of benefits to producers and society as a whole. Import restriction measures, to protect sectors where development is considered critical to national economic growth/food security, should be designed to ensure that short-term losses (e.g. high market prices for consumers) are offset by medium-to-long-term benefits.
- Deciding whether or not to protect the sector through import tariffs or quotas, and
  implementing the best system for administering such measures. Tariffs tend to be
  preferred over quotas because: (i) they generate a revenue for government (under
  an import quota system, however, a licensing fee may be charged on importers); (ii)
  there is less opportunity for fraud/corruption because, under a quota system, public
  authorities decide on allocations among eligible importers; and (iii) they do not provide incentives for smuggling as there are no upper limits to the quantities imported.
- Formulating a medium-to-long-term strategy to remove tariffs/quotas. This should include efficiency-enhancing investments in the livestock sector – e.g. in animal health services, livestock-related infrastructure, etc. – for producers to become competitive on international markets once import restriction measures are phased out.

The following are just a few of the concerns associated with import restriction measures:

- While import restrictions may contribute to increasing prices of meat/dairy products on national markets, they are often accompanied by welfare losses for society. Such price increases are not necessarily offset by medium-to-long-term sector development or by higher government revenues.
- Following the introduction of import restrictions and increased profitability for the protected sector, farmers are expected to invest in productivity-enhancing technologies. However, the import restriction measures reduce investment incentives for livestock operators, who are granted privileged access to local markets.
- Tariffs/quotas are effective only when regularly adjusted to respond to changing market conditions, both international and national. Drought and outbreaks of transboundary animal diseases, for example, determine changes in the supply of and demand for livestock/livestock products, which could make existing tariffs/quotas detrimental to society.

 Once import tariffs/quotas have been established, both local producers and policymakers may oppose their removal. This is because they create a competitive edge for the producers and generate revenue for policy-makers. Ultimately, national governments may be tempted to set up import tariffs for revenue-enhancing purposes only.

#### Bo 38. PORK IMPORT TARIFFS IN CHINA

rld' large ør d cer føig ea (43 illi e i 2007) a d a aj r Chiai he i ører førk,øariclarl ffrze c fr he∪iedSae adCaadahaare biec a 12 erce ad valorem i er ariff. I he er f 2006, break f'bl e ear dieae′(or rciereor d cieadre orira r e) bega deci a e he c r ′ øig dr 🐢 🐢 la i , i h re ha 2 illi 🐢 ig i fec ed a d 400 000 la ghered. A he i fec ed a e ire øig far ca be i fec ed i hi he øace f hree øig ere highl c agi eread raeidl i la d fr fi e da he ir he ca alarea a d he e.IAa 2007, he ir a reø redi 25 f he c r' 33 ør i ce-le el Diii , i cl dig Sich a, he large ø rk-ør d ci g regi . O i g red ced øølie føig ea, b Aøril 2008 he rice for rk had i crea ed b er 150 rerce c rared i h ear earlier. A 🔹 rki he aff rdable ea fr Chiecc er, he i crea ed arke ørice a d rk-i d ced i fla i f rced he G er e i er e e. G er e fir relea ed øar ra egic • rk re er e a d he rela ed a ber fi 🖝 r re rici ea re.l øaric lar, i Ma 2008, he Mi i r f Fi a ce red ced he i ø r ariff fr ze 🔹 rk, fr 12 6 erce er he eri dJ e Dece ber, a d bea eal (a aj rc -5 2 erce . 

I 2008, Chi a i 🖝 r ed al 2 illi e f∳rk, ∳fr | 700 000 е i 2007, ail fr he EU, Brazila dhe Uied Sa e. Iaddii , allh gfar i he large h g-er d ci g area recei ed b idie e i ale US\$15 freach de aid a d her recei ed US\$15 f r each breedig b ar. The ber føig frale i crea ed b al 7 erce , he 🔹 🖌 la i gre fld er he,≉re i ear, a d eig erice abilize. Fi all, i Ja ar 2009, he G er e i r d ced a e arreared arke i er e i che e, he Na i al S i e Price Aler S e Pre e E re e Price Fall (e 🛭 rar i 🏓 e a i ), i rørice redade refficie far er rer. A 🔹 rki he i 🖝 ra eafr Chie e c er, ai ai i g able 🐢 lie a d е.

Sources: E j g Cha, 2007; . heøig i e.c .

#### 3.4.3. E por re ric ion mea re

Restrictions under this heading, such as tariffs or quotas, have the objective of containing exports, increasing availability of key products on national markets, keeping prices low and, ultimately, benefiting both local consumers and society as a whole. They are typically applied to selected agricultural products (e.g. rice); raw materials (e.g. steel); environment-related commodities (e.g. wood); and strategic products (e.g. arms). Export tariffs may be

 $ad\langle a' : e \rangle$ , specific or compound, i.e. a combination of  $ad\langle a' : e \rangle$  and specific tariffs; quotas set a ceiling on exports of certain products. As export restriction measures alter prices and distort both national and international markets, WTO recommends that they

#### Bo 39. BEEF EXPORT BAN IN ARGENTINA

Arge i a' i fla i reached d ble fig re i 2005. Ri i g c er de a d, caraci rai , a e ar 🖸 lic ce red ar d a fied i al e cha ge ra e, a d gr c i q age ere re aeeared be he ajrca e førice i crea e. A beefia ajr er Price I de , acia ake caiiflai, icldig с 🔹 е f he C re ric i beef e 🗸 r . I deed, i March 2006, he G er e i 🗸 ed a 180-da beef e 🛉 r . The ba did , h e er, re🏽 ire e 🛉 r er ca cel ei her c rac ba ihfreig ber rbilaeralc r -ba ed agree e , a d did i cl de he -called Hil Q a (28 000 e fhigh-<sup>u</sup>ali frzec deied frheEU, free fariff). He er, flligide øread c he ec dhalf f 2006 he G er e had ea ed he beef e er re rici b e i ga eør 🍕 afr Je Ne ber ha ae 🍕 i ale 40 øerce falle 🗸 r drig he a e øerid i 2005. Addii al 🧌 a rela a i i J I a d Seø e ber 2006 all ed 70 eerce fall beef e e r ed i 2005. The ba frhee 🖝 r fab аее all lif ed a dreelaced b a 15 erce e e r a .

... The e 🖝 r re ric i ea re, hich ere e ec ed i crea e he f beef he a i al arke b ab 600 000 e, kee erice l a d heled с ai i flai.b ere largel i effec i e, if d righ har f l he Arge i ea ec Fir fall, hile here ha bee a i crea e i he 🐢 I f Arge i ea beef аi al arke , hi ha ra la ed i a d ard re d i ørice beca e he ea c ed i hi he c r are er differe fr C hee freør.Sec d, cicha ge i her le/reg la i hae deried heie e ice ie frcale ha e i ched fr beef bea ୶ r d c i : acc rdig far er, e f h e e i a e, he ca le 🖸 🦸 la i ha d i dled b 7 🖉 erce i ce 2006. Third, he I g dr gh f2008/2009 i hece ral-rh fhec r deci a ed heca le 🗸 🖉 la i . Tradi i e f he large rld'beefe ୶ rer, Arge iacrre Irak ee h; a di all а ideri 🖝 rigbeefi cigear. ee c

Sources: McD ell, 2006; .beef agazi e.c .

#### 3.4.4. Sani ar and ph o ani ar andard

Animal health and food safety standards and regulations may act as barriers to trade in livestock and animal source foods. The 1995 WTO Agreement on Sanitary and Phytosanitary Measures acknowledged a country's right to protect itself from risks to human, animal and plant life and health, but requires that SPS measures be based on scientific grounds (risk assessment) to avoid countries using them as trade barriers. The SPS Agreement also provided that, if a country adopts an SPS measure that conforms to an internationally agreed standard, the measure is consistent with the SPS Agreement, i.e. the country has no obligation to provide a risk assessment; the measure is considered as non-discriminatory; and the country becomes immune from legal proceedings under WTO regulations. A developing country willing to comply with international SPS standards should do the following:

- Upgrade its SPS standards to the scientific and technical standards published by OIE. The OIE Terrestrial Animal Health Code details the health measures to be used by veterinary authorities for the safe trade of animals and animal products, and reorganizes public agencies/departments (including veterinary services) to ensure that SPS regulatory regimes are enforced.
- Provide training/services for stakeholders along the livestock supply chain to make use of the technologies/husbandry practices needed to comply with SPS standards. This includes financial support, if necessary, as some investment may be needed to meet SPS standards.
- Establish strong, constructive links with livestock stakeholders. Whereas the SPS Agreement stipulates that importing countries should accept other members' measures as equivalent, it is up to the exporting country to demonstrate objectively that the approach taken to comply with international SPS measures is effective. This can only be done by partnering with stakeholders along the supply chain.
- Be ready to accept audits by importing countries. OIE standards provide a framework for importing countries to conduct audits of exporting countries, and in particular to check that exporting countries comply with OIE standards regarding the quality of veterinary services and animal health.
- Participate in OIE meetings in order to contribute to the definition of animal health standards and procedures. This may require countries to have overseas representations as well as the human, technical and financial capacity to provide technical inputs.

The following are issues related to international SPS standards on animals and animal products:

- Some developing countries find it extremely difficult to comply with recommendations contained in the OIE Terrestrial Animal Health Code. Such countries rarely have high-quality veterinary services, and farmers may lack the technical and financial resources necessary to comply with international SPSs. While most animal disease risks are legitimate, some could be 'fabricated' to restrict trade unjustly. Developing countries, however, may find it difficult to prove that some SPS trade restrictions are illegitimate. In addition, the WTO dispute settlement mechanism, whereby a complainant may impose a penalty on an offender (e.g. punitive tariff), is often unattractive to developing countries because such a penalty may be more harmful to the national economy than to an offender.
- Few developing countries can afford to participate in developing the SPS standards established by OIE. Many argue that while such standards mostly reflect the needs and fears of the industrialized world, they are not necessarily appropriate for developing countries.
- Paradoxically, international standards may allow developing countries to create nontariff barriers to other developing countries. For instance, a country such as Malawi could refer to international standards in order to ban beef imports from Zambia, even though it does not itself apply SPS standards.

# Bo 40. INTERNATIONAL SANITARY AND PHYTOSANITARY STANDARDS ON BOVINE SPONGIFORM ENCEPHALOPATHY (BSE)

BSE i a fa al e r l gical di ea e ha affec ad l ca le. I i likel øread b he с i efr cale, he a de el 🖌 he h a fr fad c dieae k a aria Cre zfeld - Jak b di ea e. OlE ha e abli hed g ideli e f r ør d c a h rized f r i ør baed heBSErika fhee ୶ rigc r: egligiblerik, crlledrik r deer iedrik, deøe dig, a a e e fherik a ialadh a healhi he i∉rigc r.Therik a ibaed frcrieria,ae i heOIETerrerial A i al Heal h C de: (i) a a e e f he i cide ce f BSE; (ii) a e abli hed ør gra e frhedeeci fø ible BSE cae; (iii) cølr ificai ad eig fø ible BSE cae; a d(i) hee ie ce far, or ed lab ra rade ig ør ced re fri e cllecedi he reilla ce er gra e. I Ma 2009, OIE e bli hed ali f e berc rie ca eg rized b BSE ri k. Arge i a, A ralia, Chile, Fi la d, Icela d, Ne Zeala d, N r a , Paraga, Siga, re, Sede a dUrga ere recgized a egligible-rik crie. OIE g ideli e rec e d ha all beef fr egligible-rik c rie be a h rized f ri ୶ r, afer he da e fa effecie feed ba c r l he øread f he i fecie age . A her 32 c rie, i cl di g Brazil, he U i ed S a e a d he U i ed Ki gd , ere rec g ized a c r lled-rik c rie. Fr ch c rie, OIE g idelie rec e d ha all freh ea ad ea ørdc, e ceø frea echaicall eøaraed frhe kllad erebral c l fer 30-h-ld cale, be a hrized fri 🖸 r, al gac rlør ced re are i ølace. Rece ded crlør ced re i cl de a e-a dø - re i øeci fall cale frhac 🛛 🛉 i, aba cerai -a🎺 red ig rlagherig ør ce e, ad erificai ha he ea r ea ør dc hae bee ør dcedad hadled i chaa er hahe hae bee caiaed ih recificaeriala rik (chabraiadee) rhahe eafrer 30-h-ld caleha bee echa icall ereara ed fr he k ll a d er ebral c l . The OIE g ideli e rec e d ha deb ed kele al cle ea (e cl di g echa icall er ara ed ea ) fr ca le f30 h fage r le bea h rized f r i 🖌 r fr all c rie, i h regard BSE rik, ør ided rik a erial are re ed a d he ca le ere bjec ed ei her a ig,∉r ce i ligadeice ijec c ,∉re ed air rga i he craialca i, r a ∉ichiq ∉r ce .

A OIE ca blige c rie c f r i g ideli e / a dard, cer ai c rie ( cha Jaça a d he Reç blic f K rea) ha e e heir , re ri ge i çer reveiree . O he i er a i al arke, heref re, here e i a arie f differe BSE-rela ed i çer re ric i ha i çair he abili f e çer i g çer d cer ell çecific çer d c here he are highl al ed, decrea e hera ge f çer d c eligible f re çer a çar ic lar arke, a d i crea e çera i g c .

Sources: USITC 2008; . ie.i
# 3.4.5. Di ea e-free e por ⊌one

Official OIE recognition of the absence of certain diseases – including FMD, rinderpest, CBPP and BSE – is critical for WTO member countries to engage in international trade of

 The presence of disease-free export zones may well contribute to asymmetric livestock sector development in some regions, because of public and private 'overinvestment' in such zones.

### Bo 41. FMD DISEASE-FREE ZONE IN BOTSWANA

Lie ckela acriical r lei heec f B a a. The beef e 🗸 r 🛛 arke der • i helie ckid r:iie iaed haal 90 øerce fallbeef 🖝 d cedie 🖝 red erall al e f re ha US\$40 illi . Theref re, c r l fFMD i cri ical f r he fra c r ai ai i 🖸 i i er a i al arke . Ba a ha ad 🖉 ed a 🧖 lic frFMD crlbaed effecie øre e i , raøid de eci a d 🖲 ick-re ø e echai.FrFMDc rlørøe, hereare r : (i) area here acciai i 🖉 racied; a d (ii) area here acciai i rie, a el, Jaøa a dhe Reø blic fK rea, ake a di i ci i 🔹 rigc be ee rie here acciai i •raciedadh e ha are FMD-free ih FMD-free c acciai). Bhz e are er eced b dieae-c r l fe ce, hich e eara e he ca le ildlife (aj r carrier a d ra i er f FMD). There are al fr ra egicall *e*laced lie ck 🖲 ara i e area here b h acci a ed a d 🛛 - acci a ed ca le are keø bef re beig la ghered/e 🖸 red. I 🏓 le e ai fhi e c e a a high c he G ere, hich ceralli, ele e a i c, i cl dig accia i agai FMD, fe ce ai e a ce, diea e reilla ce, e e i a draiig far er.

TheeiigFMD c r l e , hichi le rice frce e f dieae-freed i. he ajrørd cigarea fhec r, ha all ed Baa eørlie ck i era i al arke fr a ear. Al h gh affec ed b 🖝 radic FMD break i rece ear, B a a ha al a bee able c ai heir read a d red ce a l e ca ed brade i err ୶ i . He er, i i cer ai he her he crre be efi-c ra i ill al i if he e i hef re, he i crea ed i er a i alc 🛭 e i i li e ck arke i a iciøa ed.

Source: Maei e, 2008.

### 3.4.6. Commodi -ba ed rade

The safety of livestock products depends not only on their area of origin but also on their characteristics. Because some raw or processed livestock products are safe to consume regardless of whether or not animals are sick, this may allow countries to engage in the trading of processed livestock products even when certain animal diseases have not been eradicated. For instance, cow's milk is a safe commodity with respect to BSE because the BSE agent is not present in the milk of infected cows. A commodity-based approach to trading of livestock products, therefore, may provide developing countries with access to international markets (COMESA, 2008; Thomson  $e a'_{..}$ , 2009). Countries willing to adopt a commodity-based principle for the purpose of exporting livestock products should do the following:

- Identify the livestock commodities (e.g. beef, milk, cheese) that they may export for a profit, considering both the status and trends of international markets and their comparative advantages in livestock production, processing and marketing of animalsource foods.
- Provide scientific evidence that exporting processed livestock products from diseaseaffected areas is equivalent to importing livestock products from disease-free countries/areas, in terms of both animal and human health risk. International standards (which are detailed in the Codex Alimentarius) should be applied, such as maximum residue levels for veterinary drugs or specific hygiene practices in slaughterhouses.
- Commodity-based export policies require investments both in structural facilities (laboratories and testing equipment; export-quality slaughterhouses) and in human capital (training and dissemination of information). Despite the fact that the benefits of commodity-based policies largely accrue to the private sector, positive spill-overs can be expected on the entire economy (e.g. increased foreign earnings/reduced public health costs), which may justify investments by the public sector.
- Exporting countries should be ready to accept inspections and audits by importing countries that wish to be assured that a credible food safety system is in place.

Both technical and institutional constraints limit the feasibility of commodity-based export policies:

- Most developing countries have a comparative advantage in exporting low-cost raw agricultural products/live animals for processing elsewhere, as few of them have the necessary facilities for processing in-country.
- Limited financial and technical capacity make it difficult for some developing countries to set up and manage export-quality processing plants/slaughterhouses to international standards. In many cases, donors have been the major financiers of such plants, which often operate at limited capacity.
- Although a commodity-based approach is accepted by OIE, specific standards and procedures for a number of processed commodities are still to be developed. However, many developing countries do not have sufficient scientific resources to prove the safety of certain livestock commodities, and continue to invest in creating diseasefree areas to boost exports.
- Governments may assume that commodity-based trade would immediately generate foreign earnings. However, the process involved in gaining international market shares is lengthy and uncertain, and it may be years before the benefits of commodity-based measures finally offset initial investment costs.

### Bo 42. A MODEL EXPORT SYSTEM FOR DE-BONED BEEF

et al. (2009) •r • e a del ha ld hele c rie affec ed b ra b dar Th a i al di ea e e 🖝 r de-b ed beef i er a i al arke . De-b ed beef fr hich I øh de adrik aeriala ciaed ih BSE hae bee re ed i afefr he c hac ♦ i , irre ♦ ec i e f he her r r here he ea i er d ced i rec g ized a free fr -called ra b dar di ea e (e.g. FMD). The 🖝 🖌 ed del hree ajrc 🖸 e : (i) a e 🖉 r-grade aba ira d ea 🖉 r ce i g facili b ild ca be ereeared i acc rda ce ihi er ai al a dard; (ii) here de-b ed beef c a raceabili ρ e re ha beef ca le c e fr a ell-defi ed regi affec ed b l afe, if a , a i al di ea e; a d (iii) a 🧌 ara i e h ldi q facili here ca le ca be i la ed f r a lea hree eek a d rea ed/ acci a ed. Thi lde rehaheaial be<sup>1</sup> e l la gheredare ifeced ih heraialdieae/z е.

lde reheradig fafelie ckørdc: The er ed del he e ha d, he er ce i g facili ie ldbe aagedilie ih herewire e frac ear e , a defi ed b OIE; he herhad, hede-bigørce ad re al f I ∉h de, ad her aerial arika ciaed ih BSE, ld f r her i crea e he afe f he er d c. Fr de-b ed beef, i a e i a ed ha, a erage, he BSE ir rie i e f 154 illi i fec ed carca e . If ca le ere al acci a ed agai BSE, he ri k h a heal h ld be al e irel eli i a ed.

Source: Th et al., 2009.

### 3.4.7. Trade-enhancing infra r c re in e men

Poor infrastructure and logistics raise transaction costs and prevent developing countries from profitably trading on international and intraregional livestock markets. Many governments have therefore designed and formulated public or public-private programmes to build livestock-related infrastructure, such as quarantine areas, export quality slaughterhouses and tanneries, with the aim of facilitating the trade of livestock and livestock products (Nordås and Piermartini, 2004; WTO, 2004). Public investments in livestock-related infrastructures call for the following:

- Assessing existing international market opportunities, and ascertaining whether livestock producers would be able to compete on regional/international markets once key livestock-related infrastructure had been built.
- Identifying public and private costs and benefits of given trade-related infrastructure for livestock/livestock products. Since both the public and private sectors are expected to benefit from increased trade in livestock products, institutional mechanisms could be devised to share the investment costs of export infrastructure.
- Establishing a self-sustaining institutional mechanism to manage and maintain traderelated infrastructure, including user, export and membership fees, etc.
- Identifying (and subsequently providing) the technical and financial services necessary to enable livestock farmers to use trade-related infrastructure and tap into international/regional livestock markets. This might also involve a traceability system and compliance with international hygiene standards.

Building infrastructure may appear to be a relatively easy way of promoting the trade of livestock and livestock products. However, there are challenges:

• Livestock farmers in developing countries are rarely competitive in terms of interna-

# 3.4.8. Q aran ine ⊌one

Quarantine zones comprise infrastructure where animals are kept in complete isolation, with no direct contact with other animals, in order to undergo observation for a specified period. During quarantine, the animals are subjected to various tests and treatment so that the veterinary authority may be sure that they are free of/not affected by certain diseases (Paarlberg e a'., 2004; www.dfat.gov.au). Quarantine establishments may be set up both by livestock e.g.k e.g.k f[inary4 TdT40(llowtoc:4.6 scn/GS1 gs/T1<u>1</u> 1 Tf10 0C0Td[(et)-162p)-162puar@07400014.6



treatment of animals, fees, and disinfecting procedures. Quarantine rules may differ according to animal species and diseases involved, but, in any case, for quarantine to be effective to any degree, the livestock should be isolated and contained for at least 14 to 21 days.

• Quarantine measures and practices should be constantly reviewed and adjusted to take account of the changed disease status of a country, changed requirements of trading partners and scientific developments in animal health diagnosis and treatments.

When setting up quarantine zones, governments should be aware of the following:

- It is difficult to identify an appropriate level of risk because aiming at zero risk of animal disease transmission is impossible, from scientific and managerial standpoints. However, countries may wish to follow the international risk-assessment procedures established by OIE.
- Lack of human and financial resources may not only delay quarantine activities (quarantine requests should be treated expeditiously) and restrict/slow down trade between regions and countries, but may also make quarantine ineffective. For instance, in the Yemeni quarantine stations (in Aden, Mukulla and Mukha) there is very little isolation of animals, which are quarantined for only two to ten days depending on the time of the year and number of animals involved.
- Financial and knowledge barriers may prevent some developing countries from adopting technologically advanced and least-trade-distorting quarantine measures.
   For instance, setting appropriate quarantine fees, which take account of private/ public costs and benefits, is a challenging task, and incorrect evaluation may even contribute to reduced livestock trade.

## Bo 44. QUARANTINE FACILITIES IN MALAYSIA

The A i al Q ara i e Ser ice f he Derar e f Ve eri ar Ser ice (DVS) ha ad red ric 🛯 ara ie ea refri 🖸 redlie cki rder 🖉 ree heir d ci ad ୶ read fa i aldiea e i he c r. Alh gh, i Mala ia, alli ୶ reda i al are reviired hae bee cerified a healh ad free fri feci ad cagi dieae bheeriar ahri fheeørigc r, "araie eare are cidered ece ar e re ha a dieae-ic baiga i ali de eced. Qara ie re 🏾 ire e , cha hereerid fc fie e i hereara ie ai , differaccrdig hereecie fa i alc cer ed, he 🛉 r 🛉 e fi 🆸 r a d he radi g 🏟 ar er. Ba icall, Mala ia differe ia e e e rigcrie i ca egrie : ched led crie, i cl dig Aralia, Ne Zeala d, U i ed Ki gd (i cl di g N r her Irela d, Irela d, Si gaø re, Br ei, Jaøa ad Sede) ad - ched led crie, ael, all her. Lie ck fr ched led c rie d eed be 🧌 ara i ed, herea e 🖉 rer i - ched led c rie h ldb k øace a he 🖲 ara ie ai befre hea ial are e øeced arrie i Mala ia. A i al i 🏽 ara i e are bjec ed a i ar ea re cha accia i , a d bl d r hercliical e dee ed ece ar b he e eriaria a h ri . N a i al i relea ed fr he ara i e a i i h bei g cer ified free f di ea e.

Q ara i e facili ie are er ided a all aj re r e i i Mala ia, cha KLIA See a g, Kela g P r, Pe a g, Pada g Be ara d Ra a Pa ja g. The e ara i e a i ge erall ee rk ell. F r i a ce, ca le i e red fr Ca b dia are ara i ed f r a i i f e da ; he are re-acci a ed agai FMD a d er a e le are c llec ed ra d I fr 30 e erce f he a i al, f r de ec i f FMD a ib die. The ca le are b e e I ra e red b ealed r ck ae red agai di ea e.

Source: .jøhøk.g . .

because of spill-overs of research outcomes.<sup>7</sup> Second, even when research outputs are private goods, the private sector rarely invests in activities that benefit the poor because they have limited purchasing power and are seldom seen as potential clients. Third, research is often risky and uncertain in terms of timing, budget and output, which further reduces incentives for the private sector to invest in livestock research. Finally, economies of scale make it profitable only for very large investors to undertake research, because the risks and uncertainties associated with outputs decline the greater the size and scope of a research portfolio.

In the developing world, research has largely been carried out and funded by public or quasi-public institutes and agencies, but limited resources have often led to discouraging research results. In recent years, however, developing country governments have formulated a variety of policies/programmes both to improve the effectiveness of public research and to attract private-sector funds and capacity. These include institutional reforms of national agricultural research systems as well as 'push and pull' strategies - the former subsidize research inputs; the latter pay for research outputs - to sustain all basic, applied and adaptive research (Asopa and Beye, 1997; Kremer and Zwane, 2005; Roseboom, 2004). (i) Basic or fundamental agricultural research builds upon abstract principles of pure natural science and, while it does not have a directly relevant implication for the poor over the short term, it constitutes the basis for developing new technologies, techniques, varieties and strains in the medium to long term. (ii) Applied agricultural research seeks to solve well-identified biological, chemical, physical or social problems, and therefore targets specific farmer groups or segments of population. (iii) Adaptive research, which is usually carried out on-farm – with the farmer contributing land, labour, knowledge and other inputs - aims at discovering and demonstrating technologies and practices that can be implemented by farmers both practically and effectively.

The following sections deal with common approaches to improving the effectiveness of research in agriculture, including the livestock sector.

4.1.1. Dece raliza i
4.1.2. Ma chi g re earch gra *
4.1.3. Le -f ded re earch*
4.1.4. C ∉eiiereearchf d*
4.1.5. Sregheigiellecalørøer righ
4.1.6. Par ici¢a r li e ck re earch*
*Ma bei,øle e ed b lie ckdeøar e ∕iirie

### Table 8. POLICY AND PROGRAMME OPTIONS FOR LIVESTOCK RESEARCH

<sup>&</sup>lt;sup>7</sup> The spill-overs of research outcomes are relevant for both the private and public sectors. For instance, some governments may have less incentive to fund and carry out research activities because it is expected that research outputs will sooner or later be available on the international market and free of charge. What would be the incentives for the Guinean Government to carry out research on trypanosomiasis if neighbouring Côte d'Ivoire were to invest heavily in trypanosomiasis eradication and control? In these cases, cross-country (international) research programmes may be a way of reducing the free-riding problem at the country level and helping to raise adequate funds to address common development constraints.

### 4.1.1. Decen rali⊌a ion

Decentralization means transferring responsibilities from central to local governments, based on the assumption that local governments are more efficient at delivering public goods because of their first-hand knowledge of local needs and lower delivery costs. In recent years, decentralization has been applied to a variety of government functions, including agricultural research, which, in many countries, has always been highly centralized (Chema  $e_a'$ , 2003; Lai and Cistulli, 2005; Smith, 2001). A programme for decentralizing livestock research calls for the following:

- Identifying the type of activities to be decentralized, including basic research, applied research and on-farm research. As a general rule, decentralization targets both applied and on-farm research, which might be better executed by regional and local research institutes. Basic research tends to remain centralized.
- Deciding whether to use a commodity or agroclimatic approach. The former involves
  the creation of specialized research centres focusing on a few agricultural commodities such as rice or milk; the latter the setting up of research centres in different agroclimatic zones of a country in order to address constraints in specific regions. The two
  approaches certainly overlap, because agroclimatic conditions largely determine the
  portfolio of viable agricultural/livestock activities.
- Devising and implementing institutional mechanisms to facilitate interactions between local research institutes and end-users. The purpose is to bring researchers closer to farmers, which is critical to the effectiveness of decentralized research.
- Reforming research-funding mechanisms because, without financial autonomy, administrative decentralization is not sufficient to improve the efficiency of national agricultural research systems. As a general rule, a mix of central and local taxes/levies is used to finance local research centres.
- Establishing an M&E system to assess the quality of, and returns to, investments in decentralized research centres and institutes. The focus should be on impact indicators because the entire decentralization exercise aims at enhancing public-sector capacity to respond to farmers' needs.

Decentralization of agricultural/livestock research does not necessarily lead to improved coverage and outcomes, for the following reasons:

- Unless decentralization is backed up by an efficient system of agricultural extension, which is not always the case in developing countries, the impact of research outputs on agricultural sector growth and the livelihoods of the resource-poor will be negligible.
- In spite of decentralization, part if not all of the budgets of decentralized/local research institutes often remains under the control of central government. Local research programmes, therefore, are often influenced, if not dictated to, by the centre, thereby reducing the efficiency gains normally associated with decentralization.
- When funded by local governments, decentralized research institutes may be more subject to pressure from local lobbies. Their research portfolios may thus favour the relatively better-off rather than the community as a whole.
- · Local governments may have less incentive to fund decentralized research institutes

because, owing to spill-over effects, research outputs may be appropriated by neighbouring administrative units free of charge.

• Sizeable research institutes may be more productive than small, decentralized institutes owing to economies orzed leorzedac(pr)18ssto research3-93(pr)18rogramm,ch3-9interexpand a country's overall agricultural/livestock research portfolio (Biggs, 1999; Carew, 2001; Janssen, 1998). Setting up matching research grant programmes calls for the following:

- Identifying domains/areas where private firms may be willing to invest, typically
  including applied and adaptive research for which they may claim credit for part of
  the result; on which the returns are highly uncertain and/or remunerative only in the
  long term; and which involve high initial investment costs.
- Determining the overall cost of specific research activities and the ratio between
  public and private contributions. In theory, the larger the externalities generated by
  the expected output, the less the private sector is willing to invest and, hence, the
  higher the public contribution necessary to attract private investors. The typical ratio
  is however 1:1, i.e. for each dollar received from the public sector, the private sector
  contributes one dollar, either in cash or in kind.
- Establishing clear criteria for identifying and selecting eligible private research partners – e.g. technical capability, availability of human and financial resources, bidding procedures, and screening and evaluation methods.
- Setting up a mechanism for allocating matching grants to selected institutions as well as an M&E system to ascertain whether recipients of matching grants are in fact conducting specific research and generating the agreed deliverables.

Matching grants can be an effective tool for improving the scope and coverage of agricultural research. However they face challenges:

- Matching grants are largely, if not only, used to sustain applied/adaptive (not basic) research, which ensures that only private investors have sufficient incentive to undertake specific activities.
- It is almost impossible to quantify e a e the costs and benefits including the externalities – associated with most research activities. In practice, it is not easy to determine the optimal level of matching grants which, ideally, should be different for each and every activity.
- Miscalculated matching grants may end up 'crowding out' private investments: when the public contribution is too small to provide incentives for the private sector to increase its research investment beyond what it would have funded on its own, private firms may simply reduce their budgets by an amount equal to the matching grant.
- Owing to imperfect correlation between research inputs and outputs, it is difficult, and costly, for the public sector to ensure that matching grants are allocated exclusively to agreed research activities. Therefore, public authorities often award matching grants with the proviso that there should be some degree of collaboration among public and private research centres.
- In many developing countries, few private firms/institutes undertake agricultural and livestock research; this inevitably limits the effectiveness of any matching grant programme.

### Bo 46. MATCHING RESEARCH GRANTS IN MALAYSIA

I Ma 2005, he Mi i r f Scie ce, Tech I g a d I аi f Mala ia e abli hed Bi echC re, ager еedage c re 🖸 ible f ride if i g al e 🖉 r 🖉 i i i b h reearchaddeel ୶ e (R&D) ad cerce, ad fr 🐢 rig che reiafiaciala i a ce a d de el 🖸 e al erice. Bi echC río ha e 🕡 a a chig gra ør gra e, hich fia ce R&D aciiie e øec ed delier e ri ør ed ech l gical e , dead rga i arelica i ha e bi l gical , r deriaie here f, ake r rer ce e f recific e. Aeelica dif ør d c fr a chig gra be aj ri ed Mala ia c 🐢 a ie, hich: (i) ha e he aj ri fheirbie aciiie a d i hi Mala ia; (ii) ha e e ୶ ee er hir f, r he righ e, a i ellec al er eercialize he a icie a ed i a i ; a d (iii) ha e are eria e re earch eeded с er ca୶aci . The a i f dig øer ør jec i e a RM1.0 illi (ab US\$275 000), ih Bi echC re a chi g 'd llar-f r-d llar' i acc rda ce i h agreed i rigidica r, r ided he gra i ed i hi ear f he a er al da e.

A fed-Dece ber 2008, Bi echC re had all ca ed al US\$3 illi hr gh i g her hig, heegra a chi g gra 🛛 🖝 gra e. A ere frlie ck-rela ed reearch (rec bia a i al accie; arker-a i ed breediq or gra e; i or ed a i alfeed hr gh bi ech l g ar elica i ). Whe her r he R&D er jec f ded hr gh he a chi g gra ør gra e direc l be efi he re rce-ør, e øeciall allh lder lie ck far er, ia 🕡 e i e. H e er, here i d b ha Bi echC re ha bee cce fli a racig øria e- ec ri e e i li e ck re earch.

Sources: .bi echc rø.c . ; .bi di .rg/c e i .

## 4.1.3. Le -f nded re earch

Commodity levy programmes finance specific agricultural or livestock research though charging a levy per unit of output (in quantity or value) to identified stakeholders. The underlying basis of such programmes is the assumption that some research outputs produce private benefits – i.e. they could be paid for by the main beneficiaries – and that a mechanism is needed to coordinate individual producers so that they provide sufficient research funds. Commodity levy (or check-off) programmes may be managed by the public and private sectors (e.g. by an industry organization, such as one finds in several industrialized countries), with farmer participation either compulsory or discretionary (Alston e a'., 2003; 2004; Klerkx and Leeuwis, 2008). Setting up a commodity levy programme calls for the following:

- Identifying agricultural/livestock subsectors that can support a commodity levy programme. For instance, it would be difficult to establish a programme for a subsector dominated by thousands of small players – including producers, processors and traders – or for a sector where the output is too small to generate significant research funds.
- Specifying the research activities to be funded through the levy. Funds are usually
  used for research that produces immediate benefits for end-users, thereby encouraging farmers to participate.

- Identifying the levy-payers who, on paper at least, can be stakeholders along the value chain. In most cases, however, farmers or a subgroup of agricultural producers (e.g. exporters) are expected to pay the research levy.
- Defining the characteristics of the levy: Is the levy charged on the quantity produced/ sold, or on the value of production/sales? Is it linked to farm size/number of livestock heads? Is it progressive, regressive or neutral? The characteristics of the levy are critical as they determine the amount of funds to be raised and, ultimately, the research undertaken.
- Setting up an institutional mechanism for levy collection which very much depends on the characteristics of the levy (e.g. a levy charged on sales will most likely be collected by actors in the marketplace, such as wholesalers) – with responsibility entrusted to either the public or private sector.

Issues regarding the effectiveness of levy-based research programmes include the following:

•

(e.g. thousands of backyard poultry farmers). The more a sector is underdeveloped and unorganized, the greater the difficulties in setting up a levy-funded research programme.

•

- Identifying issues/questions for review by local research institutes, including areas
  of research (e.g. technology development or animal husbandry management) and
  expected outputs (e.g. improved breeds or reduced post-harvest loss). To the extent
  possible, research domains and objectives should be decided on the basis of consultations with potential bidders.
- Establishing an institutional mechanism to define the rules and operational procedures regulating competitive funds, such as eligibility criteria for potential competitors; application procedures; screening and selection criteria; procedures for releasing funds, etc. As a general rule, the stricter the rules, the lower the number of potential bidders and the screening/evaluation costs; but also the lesser the likelihood that research institutes/centres will propose innovative (and potentially beneficial) research methods and approaches.
- Setting up an M&E system, because recipients of research funds are expected to conduct research-specific activities and generate agreed deliverables.

There are issues and concerns associated with competitive research funds:

- As a general rule, competitive research funds are used to finance targeted, short-term activities, i.e. they largely finance applied and adaptive, rather than, basic research. However, basic research is critical for long-term development of the agricultural/ livestock sector.
- In many developing countries the shortage of agricultural research institutes/centres makes it difficult for a competitive research fund to work properly (i.e. there is no competition). In these circumstances, it is worth investigating the viability of a regional fund, although this may 'crowd out' local research capacity. The latter partly explains why managers and staff of national research institutes may oppose any move to establish competitive research funds.



- The costs involved in setting up and managing competitive research funds are not negligible, inasmuch as they cover the preparation of proposals, screening of applications and monitoring the use of funds. In addition, competitive research funds are seldom large enough to generate the economies of scale needed to reduce administrative costs to the minimum.
- In many developing countries, the increase in competitive funding mechanisms has been driven more by donor interests than by an objective assessment of demand- and supply-side components of research outputs.

### Bo 48. COMPETITIVE RESEARCH FUNDS IN EASTERN AND CENTRAL AFRICA

The A ciai fr S re g he i g Agric I ral Reearch i Ea er a d Ce ral Africa (ASARECA) a e ablihed i 1993 b he a i al agric l ral reearch i i e f e rie f Africa. The biecie a i crea e he efficie c f agric l ral re earch i c he regi a d hereb i la e ec icgrh,fdecriadeørcøeiiee hr gherd ciead ai able agric I re. I 2004, ASARECA la ched a c 🕐 e i i e re earch gra e fi a ce regi al i egra ed agric l ral re earch fr de el ee ør jec. I øar ic lar, e er fi e ear, ASARECA dra ra egic ela ha е i øririie adfr hebai fac øeiiereearchgra che e; a he begi i g f e er Febr ar, e ial aeelica arei ied bier e al frgra. The eer e al are e ec ed becie ih ASARECA' raegic ela ; be biedbii i fr re ha e e berc r; a d ør ide de ail heeeciq rqaizai før jec a d c f r a ce i høre cribedør jec g ideli e. adør jecea, drai ha e a i i Re earch er jec al e f US\$50000 🔹 a a i f US\$300 000 er a hree- ear øeri d; f d are ea cercrer er a ec. Reearch •r • al ha ee hi cri eria •a a ec d age here er al re ie er a e heir ech ical eri , i cl di g ec ic, fi a cial a d cial i 🕫 ac ele e . The ASARE-CAGra A hrizi gad Adir Bardire 🗸 ible fr fial decii i hiregard. The ASERACA S ra egic Pla f r 2006 2015 ack ledge hei 🖝 race flie ck re earch achie e heg al fec ic gr h, i ୶ r ed f d ec ri a d 🗸 er eradicai. The ASARECA A i al Agric I re Re earch Ne rk ha ide ified a ber farea

fri øle e iglie ckreearch ør jec, icl diga i al healh; lie ckfeed ad aerre rce; a i algeeicre rce; far er rga iza i ; a dø lic a al i.

Sources: .a areca. rg; ASARECA, 2005; A-AARNET, 2005.

### 4.1.5. S reng hening in ellec al proper righ

Defining and enforcing intellectual property rights (IPRs), which bestow on the 'creator' of an 'innovation/invention' the exclusive right of use for a certain period of time, may be a powerful tool for encouraging private companies to invest in agricultural/livestock research. In most countries, IPR laws are structured around the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), which establishes the minimum levels of protection that governments should give to the intellectual property of other WTO members. The World Intellectual Property Organization, a specialized agency of the United Nations, promotes the protection of intellectual properties and assists countries in developing IPR laws and programmes consistent with the TRIPS Agreement (David and Hall, 2006; Forero-Pineda, 2006; Lele *e*  $a_{..}^{l}$ , 2000). Establishing and enforcing intellectual property right laws/ programmes calls for the following:

- Selecting IPRs to be protected, such as patents, copyrights, trademarks and trade secrets. For instance, some countries grant patents on genes and transgenic animals; others refuse to allow the patenting of transgenics.
- Specifying how institutions/organizations or individuals can acquire IPRs, i.e. how their research outputs can be registered and protected through IPR laws.
- Establishing the level of protection to confer to IPRs, usually in the range of 20 to 40 years. This level should be decided by weighing incentives for research investment against the monopoly power granted to investors in IPRs. Sherwood (1997), for instance, identifies three different levels of protection: non-robust; TRIPS-compatible, largely to support imports; and investment-stimulating, which occurs only at a protection level higher than that established by the TRIPS Agreement.
- Defining a system for enforcing IPRs, i.e. applying effective, dissuasive and proportionate remedies and penalizing persons using IPRs illegally. This is possibly the most crucial element in IPR policy because, unless such rights are sufficiently enforced, there will be limited incentives for private actors to invest in agricultural/livestock research.

Heated debates on the subject of IPRs make it extremely difficult for governments to strengthen such rights.

- It is challenging to identify the correct balance between the legitimate interests of IPR holders and those of end-users, i.e. the size and distribution of benefits associated with IPRs. The benefits of IPRs are, in fact, variable over space and time because they depend not only on the characteristics of the innovation but also on the time horizon and the region's/country's level of development.
- IPR regimes may create temporary monopolies and restrict imitators' access to technology. When poverty reduction is at stake, this may have a negative impact on society, and is the main reason why many developing countries oppose pharmaceutical IPRs.
- As there are no rewards for innovations that cannot be embodied in products (i.e. cannot, directly or indirectly, be sold on the market), IPRs do not provide incentives for undertaking basic research.
- Public/private research institutes and large firms are able to comply with all the rules and procedures involved in having their intellectual inventions protected. However, as farmers and local communities are rarely, if ever, in a position to patent their inventions, there is a risk of these inventions being misappropriated by others.
- There is little enforcement of IPRs in many developing countries, which reduces the effectiveness of IPR laws and regulations. It also generates a bias towards research outputs primarily marketed in industrialized countries with functional rule of law.

# 4.1.6. Par icipa or li e ock re earch

Research outputs are sometimes of little use to potential end-users, for a variety of reasons: the output itself does not address binding constraints on development; it can be applied

- Training researchers before involving them in participatory research, which requires
  making use of approaches that balance hard science and soft skills. For instance,
  researchers should know how to select partnering farmers; how to build up trust;
  how to communicate research findings, etc.
- Setting up a system of incentives for researchers to conduct/take part in participatory livestock research. Participatory approaches do not, in fact, satisfy the strict criteria of science. They thus remain unappreciated in academic circles, which makes them unattractive to most researchers.
- Setting up an M&E system that allows for the review and adjustment of participatory research methodologies. Participatory research outputs are context-specific and cannot easily be scaled out. Therefore, from a policy perspective process lessons are just as, if not more, important than the research output er e.

A number of issues should be considered when promoting participatory research:

- Participatory research is risky in terms of process and outcome (often riskier than academic research), which, together with difficulties in establishing budgetary requirements, makes it unattractive to policy-makers. In several cases, participatory research is or has been funded through donor contributions.
- As participatory research addresses local problems, it tends to be biased by the shortterm needs of farmers, which may be inconsistent with a country's overall development agenda. For instance, poor livestock farmers may attach little value to research aimed at increasing the quality, rather than the quantity, of agricultural produce.
- The greater the degree of control that livestock farmers have over research trials, the less will participatory research produce data conforming to scientific standards and, hence, the lower the incentives for researchers. However, if the objective is to produce technology (rather than scientific knowledge) for use by farmers in a given area, there is no need to produce scientifically valid data.
- Evaluation of participatory research requires the existence of control groups, which are often difficult to identify and monitor. Farmers contributing to participatory research programmes are rarely, if ever, picked randomly, but are selected in accordance with criteria such as resource endowments and educational level.



### Bo 50. PARTICIPATORY GOAT RESEARCH IN INDIA

The BAIF De el 🖌 e 🛛 Re earch F da i (I dia) a d he Na ral Re rce I i e (Uied Kigd) hae bee i øle e igaji reearch ør jec, la ched i Oc ber 1997. ide if a daddre c rai affecigg a ør d ci i a ber f illage i h Raja ha a d Karaaka, I dia. The er jecai a de el ei gech I gie ea e r re e c rai ide ified i c llab ra i i h g a -keeøer : re earcher a d far er arer ghl e<sup>ig</sup> al ¢ar er i here earch ¢r ce a drela ed aciiie. The iial ¢ha e f ber fc llab ra i e re earcher-far er raeid r ral aeerai al he ør jec c i ed fa ide if ajr characeri ica dc rai i øre ailigga ør dci e .Li ied acce ade<sup>1</sup> a e feed re rce a ra ked a he bi di q c rai . I he ec d wha e f he wr jec, rial ere c d c ed i h re rce-e rg a-keeer a da er arie f rea e ere e ed addre ide ified c rai . M rial i I ed elece i g l call a ailable high-@ ali feed ch a grai a d ree e d; i el e al i led de- r er i ୶ r e feed e. The rial ere each de ig ed i c llab ra i iharea e adc rlgr ୶ i hea e illage, b elecigeiherrea e ad c rlqa-keerihi i ilar ci-ec icclaerreae ad crlaial bel gig he a e er.

Mirigidicar, icldigfrighlearee førdcii øara eerøer ga (e.g. ilk ørd ci) ad hleeig i høariciøa, hae h ha ga i he rea e gr ø had higher c ceøi rae ha h ei hec rlgr • . A feed øøle e c i ed føla a erial ha a idel a ailable с la d/ r ad ide a dc Idbehar e edi he lackagric I ral ea , i ha bee 🐢 ible ide if ørd ci -e ha ciq, l -c ech lgie ha ca ea il be ad ø ed b he aj ri fga-kee∉eri he ei-arid regi f Raja ha a d Kar a aka.

Source: C r et al., 2002.

### 4.2. LIVESTOCK-ENVIRONMENT POLICIES AND PROGRAMMES

Livestock production generates both negative and positive externalities on the environment. The pollution of land and water with animal waste (nitrogen and phosphorous), overgrazing and soil compaction represent the major environmental threats directly caused by livestock production systems. Animal waste also produces noxious emissions such as methane and nitrous oxide; soils are polluted by fertilizer and pesticides used for feed crops; and pressure to clear land for pastures or to grow animal feed is a major cause of deforestation, thereby contributing to  $CO_2$  emissions and reduced biodiversity. At the same time, properly managed livestock production systems may contribute to environmental sustainability: livestock are a major source of organic manure in mixed farming systems; they can preserve soil fertility in arid and semi-arid lands that might otherwise become wasteland; and they can sustain wildlife (de Haan  $e_a'$ , 2001; Mearns, 1997; Steinfeld  $e_a'$ , 2006).

A comprehensive environmental policy agenda is needed to mitigate the ecological footprint of livestock production systems and enhance the positive contribution of livestock

farming to the environment. This includes a variety of policies/programmes (e.g. land titling programmes and fiscal policies; awareness and communication campaigns; research and technology policies) that are often beyond the capacity and scope of livestock authorities. However, some policies/programmes could be designed and implemented by livestock departments/ministries because they address specific livestock-environment issues. These may be broadly grouped into two broad categories: command and control measures; and market-based measures. The former would be based on rules and regulations for the private sector (e.g. ceilings on stocking density); they therefore require that government be capable of monitoring and rewarding/penalizing certain behaviour on the part of livestock farmers. The latter aim for market prices that internalize the environmental costs and benefits of livestock systems, including all externalities, so that livestock farmers' investment and production decisions are environment-friendly (Drucker and Latacz-Lohmann, 2003; Stavins, 1998; Steinfeld e  $a'_{-1}$ , 2006).

Command and control, and market-based livestock-environment policy instruments are not mutually exclusive; neither is one category of instrument better than the other in terms of impact on the environment, or productivity and/or poverty levels. For example, establishing an upper threshold on discharges from livestock, taxing discharge, charging grazing fees or zoning livestock production are alternative policy instruments to reduce the negative environmental externalities of livestock production systems. It is therefore up to policy-makers to identify the instrument or combination of instruments most suitable for addressing context-specific livestock-environmental issues. Table 9 lists livestock-environment policy/ programme options for improving livestock-environment relationships.

4.2.1. C r lled grazi g*
4.2.2. C - aage e fc ¢a re*
4.2.3. Lie ckzig*
4.2.4. Di charge • a *
4.2.5. Paefreir ealerice*
4.2.6 Markeigfeir ealgd*
4.2.7 E ir e al a e
*Ma bei øle e ed b lie ck.deøar e /iirie.

#### Table 9. LIVESTOCK-ENVIRONMENT POLICY AND PROGRAMME OPTIONS

### 4.2.1. Con rolled grauing

Controlled grazing programmes regulate livestock farmers' use of grazing areas to ensure that production practices are environmentally sustainable, thereby reducing the impact of negative externalities (e.g. soil erosion and water pollution) and expanding the positive externalities (e.g. improved pastures and conservation of wetlands and wildlife habitat) of livestock production systems (Mearns, 1997). Controlled grazing programmes build on rules and regulations that govern access to and use of circumscribed grazing areas by livestock farmers, and are a typical command and control measure (Gollehon  $e_a^{\prime}$ . 2001;

Johansson and Kaplan, 2004); the literature refers to land co-management when the rules and regulations governing access to and use of land and common resources are generated

### Bo 51. CONTROLLED GRAZING IN SENEGAL

I he earl 1980, he Ger a Age c f r Tech ical C rerai (GTZ) fi a ced he de ig a di 🕫 e a i fac r lled grazig che e i he 🕫 ralarea f Se egal' Ce ral Ferl Regi, hich a rec rdi g i crea i g il fer ili l e . The che e c ered a area f 1500 haar da aj rb reh lead a rc reda fll : 200 ha ere e aide frrege eraig ege ai ad 100 hafrlie ckr e; ad i 200-haøl ere e abli hed, each a aged b differe far er gr . Of he e, hree ere a ig ed a cki g de i f14 r øicallie ck i (TLU = 250 kglie eigh)øerhecarea d hreea cki righee li igde i f10 TLU/ha. Thei ୶ ac fhe che e a a e edb fe ir e ala d ci-ec ic ∉ara e er er he ∉eri d 1981 1992, b h i he c r lled grazi g area a d i area here cha ge ere ୶ ed. (i) There ere differe ce i he er d c i f herbace la erbe ee hec rlledad -с r lled grazigarea, e e i ear ihade<sup>16</sup> a eraifall. (ii) Lige ege a i rege era ed be eri cr lled grazi g area ha i - cr lled ze. (iii) I ab da rai fall ear, here a a er-acc la i fbi a i c r lled grazi g area, hich hi dered øla qr hi he fll ig ear. (i) I dr gh ear a d dr ea i ge eral, lie ck rec rded higher fer ili a d l er rali ra e a d larger eigh i c r lled grazi g area ha i -erjecze.

O erall, he c r lled grazige e eri e ade ig ifica c rib i red cig e ir e al degrada i , a d l d rig dr gh ear ere here a ig ifica differe ce i li e ck er d c i i be ee c r lled a d -c r lled grazig area (b larger aria i i er d c i ere rec rded i he f r er). Fi ig ckig ra e i arid a d e i-arid area, hich are charac erized b e re e ariabili i rai fall a d eri ar gra er d c i , i ece aril he be ra eg f r red c i g he ega i e e er ali ie fli e ck he e ir e .

Source: Theba d et al., 1995.

### 4.2.2. Co-managemen of common pa re

Open access to pasture lands can lead to overgrazing and overexploitation of natural resources. Whenever a farmer is in a position to decide freely on the number of animals to graze in an open-access pasture, his/her choice will depend on a comparison between his/her private costs and the benefits he/she can expect to accrue (e.g. between the time he/she needs to pasture one more animal and the additional milk the animal will produce). Each additional animal on the open-access land will impose a negative externality on other farmers, because it will reduce the amount of biomass available. However, even though the farmer might be aware of the negative externalities his/her behaviour generates, he/she will be reluctant to reduce the number of animals he/she pastures because the other farmers will continue to pasture all of theirs. The total number of animals grazing on the open-access areas, therefore, will surpass the carrying capacity of the land (Birner and Gunaweera, 2001; Hardin, 1968; Yan *e*  $a_{-}^{I}$ , 2008). Governments could facilitate the establishment of common rules and regulations regarding the use of common pastures. These may include the following:

- Identification of open-access pastures that are becoming degraded because of overgrazing, including an analysis of the land tenure system and of the rules and regulations governing access to, and use of, natural resources by different stakeholder groups.
- Promotion of a participatory process to quantify the contribution of overgrazing to natural resource degradation. This is critical, because farmers often misjudge the causes and overlook their own contribution to environmental degradation.
- Definition of a comprehensive land co-management plan that, by taking account of
  existing common and private resources, and of potential sources of conflict among
  different stakeholders, sets out new rules for the common use of grazing land, including the rights and duties of different users.
- Provision of the necessary legal, financial and technical support for effective land comanagement, including the securing of land tenure rights, helping farmers to create collective institutions, defining ad hoc rules and regulations to facilitate the sustainable use of common pastures, etc.

Supporting participatory land co-management is anything but straightforward, however.

- Participatory processes for effective co-management of pasture land are complex, time-consuming and risky, particularly when the aim is to give voice to all stakeholder groups, including the poorest, and when frequent conflicts arise. Also, many governments are unwilling to invest resources in activities when the outcome is, at best, uncertain.
- Good co-management schemes increase land productivity and/or diminish land degradation, thereby augmenting the value of assets and leading to the risk of private

- Governments often find it difficult to provide an adequate legal basis for rules governing access to, and use of, common property resources. This is because it is difficult to bring into the legal framework all the bundles of traditional rights attached to open-access pastures.
- Returns on land co-management can be reaped only in the medium to long term, whereas farmers are obliged immediately to face costs caused by reduced livestock production. Community members, therefore, may lack incentives to support comanagement schemes unless they are compensated for any foregone income, at least during the start-up phase of a programme.

### Bo 52. CO-MANAGEMENT OF GRAZING LAND IN KENYA

f Mar abi Di ric i he Ea er Pr i ce f Ke a i cla ified a Arer i a el 75 rerce ra gela d. Differe e hicgr 🐢 🐢 la e hearea a dkee🕫 a arie flie ckicldigcael,gaad heeø,adcale (i higher-raifallarea) hich e er igifica ere re grazi g area a d c rib e de er ifica i . I 1990, GTZ la ched he Mar abi I egra ed De el 🖸 e Pr gra e (MIDP) ai ed a 🛷 r i g ra gela d rehabili ahr gh he ୶ i fe ir e -frie dl grazi g øracice. I øar ic lar, MIDP i 🐢 red he e ablih e f -called e ir e al a age e c i ee (EMC), g 🐢 🖕 le, re 🐢 ible f r rga izc 🕐 ed felder, radii alleader, e a d iqc i. rk h 🙍 ide if ai able la d- e øracice i hi heir c iie . fr b ha ech icala da cial øer øec i e. T e - i e EMC ere e abli hed a d jilagreed 🕢 a har ized a ralre rce a age e ୶ c l. N ableie i he ୶ c I rela ed rce a age e , acce grazi gla db reide a er re a d -reide, reecerai ea re a d ildlife er eci . Af er a er i i g ar, h e er, he EMC bega еc er ør ble : far er had li lei ce i e be e ber f ECM a clear; a d here a 🖝 r i egra i fc i ee; he legal a a d c rdiai а g EMC i differe eighb rh d hee e ha a area f ra gela dre ai ed ig c flica g differe ୶ a ral gr 🖸 a d c ed iie.GTZ heref regr ∉ed he 29 EMC i frlarger i crre ∉ dig differe aj r grazi g area, a d facili a ed a erie f c laie eeig, brigig geherdiric-adl cal-le elger e a hriie, NGO aciei Marabi, radii ala hriie a d EMC e ber, hele e ral gr e agree ea re red ce ba dir, hef a d rder a d reg la ed acce ra ge re rce i eighb ri g erri rie.

The øar iciøa r, br ad-ba ed ør ce cce f ll ør ed e ir e-frie dl hba dr ørac ice hr gh Mar abi Di ric. Vege a i ha rege era ed; ildlife ø achi g ha decli ed; agree e ha bee reached i h regard dr - ea grazi g-re er er le a d e ø rar re ric i ha e bee agreed i h regard area ha ca be e ered d rig he rai ea ; a d, l i a el, e ir e al degrada i ha bee hal ed.

Source: Har et al., 2005.

# 4.2.3. Li e ock ⊌oning

In terms of access to input and/or output markets, economic development is often associated with the concentration of industrial livestock production systems in strategic areastiegativities invirgendente tables the rageities calls give and a significant to a significant to

- Systematicablecalitionofpdatailongcterenologistso(k.gronbactisoofslystestos,kwith facus/pen -ment.
- forenitiolying and the state of the state
- Negotiating zoning agreements with current landowners and defining the character-<u>isters</u> to a dablie go peot it An Airs opermits given free of charge or sold on the market? Are
- Enevidient i frece raties, touble stock xo per entrices o subisidates t for eiel pradiact, one can tivit learid
- Torziviidig gancensivestsuc uses of entsitorbold talks teustaintable apilities c tirainpractices rand

Designing and implementing livestock zoning policies/programmes may well be problematic, for a number of reasons:

- Thiegdootistratightfofvappdopptateseitesefopiineslu(s)raafulivestdekspanodingtiofienvinsoisnaery-tal externalities
- A precondition for any successful zoning policy is the existence of good infrastruc-ture that allow
- Livestock operators are expected to bear significant costs for shifting their produc-

tion units and are likely to oppose any zoning programme unless they have sufficient (financial) incentive.

 Relocation is challenging, and it typically works only when farmers move to nearby areas.

### Bo 53. SITING LIVESTOCK IN WISCONSIN (UNITED STATES)

The Lie ck Facili Siig La, hich beca e effecie i Wici i Ma 2006, reg la e heiig felie ckfar (ih reha 500 aiali) ad hee 🖡 ai f eiiqlie cki (b re ha 20 øerce ad ih er 500 ai al i) i er l cai, ai al head, d r c r l, a d a e a d rie a age e . I øar ic lar, iigade,∉a i re≌e,i I calger e area hrized apprerde rder ha he ca ela a de er i e he la deae f heir c iie.Fri a ce, al cal g er e a ∉rhibilie ck ∉erai i a -agric I ralz i g di ric r a ør hibi , li e ck facili ie er a cer ai ize if here i a lea e agric l ral di ric hich all era i fall ize . H e er, i a er i glie ck i i g, l calg er fhela relaig : (i) 🖝 🖝 lieadrade-back e с . ih he er (i.e., lie ckrcrehldbeeback reha 100 ffr a ørøer lie røblicrad rrigh fa); (ii) rie a age e (i.e. la d arelica i faefr а lie ck facili ... h ld c ୶ lih he rie a age e ech ical a dard f he Na ral Re rce C er a i Ser ice ); (iii) d r a age e (i.e. a li e ck facili hall ha e a d r c re f a lea 500 ... d r c re i ba ed 🛛 ୶ rediced d r ge eraizead e flie ckfacili), d reracice, a dheer i i a ddei. (ba ed f 'affec ed eighb r ' ); (i ) a e rage facili ie (i.e. he a e rage caeaci h ld be ade • a e f r rea abl f re eeable rage eed ); a d () r ff a age e (i.e. he eredic ed a alehehrr ff adfr each e i i g a i all hee d ff rea e area... hall be le ha 15 lb if ∉ar f hea i all i l ca ed i hi r 1 000 f fa a igable lake r 300 fee fa a igable rea ).

The Deear e f Agric I re, Trade a d C er Pr ec i f heSae fWic i hac dceda ber fifrai ca ୶ aig a d ca ୶ aci -b ildig aciiie a i I calger adørdcer c øl ihheiigla. Heer, i crøraig he e iig a dard i l cal rdi a ce ha ୶ red re diffic l ha e ec ed, hereb e i g 🕐 he la challe ge fr a lie ck ∉era r.

Sources: Wic i Deear e f Agric I re, Trade, a d C er Pr ec i , 2007; .le i. a e.ed .i. .

#### 4.2.4. Di charge q o a

Livestock manure is a source of nitrogen, phosphorus and many micronutrients that improve soil fertility. However, pathogens, excess nutrients and organic matter from livestock manure may contaminate soil and water. The establishment and implementation of discharge quota systems, which set ceilings on the quantity of livestock manure that can be released in the soil, may contribute to reducing the negative externalities on the environment generated by some livestock production systems (OECD, 2004; Vukina and Wossink, 2000; World Bank, 2005d). Designing and implementing a discharge quota system calls for the following:

- Identifying livestock production systems that contribute to environmental degradation through excessive manure discharge, depending on the numbers and species of farm animals, production technology, soil characteristics, etc.
- Defining a discharge-pollution equation and setting environmental targets necessary to identify the maximum acceptable quantity of manure discharge from livestock. When reviewing the manure-pollution interface, account should be taken of farm characteristics, prevailing technologies and production practices in order to avoid setting overambitious environmental objectives.
- Setting discharge quotas and establishing a quota allocation mechanism. For instance, manure quotas: may be based on numbers of animals or farm sizes; can or cannot be sold/bought on a dedicated market; may be provided free of charge and shared equally among livestock farmers; or may be sold, auctioned or allocated in accordance with predefined parameters (e.g. livestock per unit of land).
- Setting up an institutional mechanism to implement the quota system, which implies issuing and allocating manure quotas, providing adequate incentives for livestock farmers to respect the system – including financial support and technical assistance when necessary – as well as monitoring and evaluating its impact both on the environment and on farmer livelihoods.

Constraints on the design and effective implementation of discharge quota systems for livestock include the following:

- It is difficult to identify the 'optimal' discharge quota because several agro-ecological and biological parameters contribute to determining the level of pollution caused by manure. A lax quota would be ineffective at containing pollution; too binding a quota could lead to excessive socio-economic costs, for both farmers and society as a whole, in terms of reduced availability of and increased prices for, animal-source foods.
- Discharge quota systems do not directly benefit livestock farmers and often represent a net cost for them, at least in the short term. Many farmers therefore oppose the introduction of manure quota systems unless they are well compensated and/or an effective communication/awareness campaign is conducted to convince farmers of the long-term benefits of reduced discharge from livestock.
- Discharge quota systems often require farmers to maintain records of their livestock/ land/production activities. In some developing countries, (small) farmers are often unable to comply with this requirement and, as a result, may be forced to quit livestock farming altogether.
- Implementing and monitoring discharge quota systems calls for high-quality technical and institutional capacities beyond those available to governments in many developing countries. In addition, evaluating the ultimate impact of a manure quota system on the environment is difficult because of the variety of environmental laws/rules that both govern/affect agricultural (and livestock) production activities and have a bearing on the environment.

### Bo 54. MANURE PRODUCTION RIGHTS IN THE NETHERLANDS

Q a fraial a re ørd ci ere ird cedi he Ne herlad i he 1980, a ¢ar fa i f¢ lic ea re deal ih hee ce ie releae f rie i he il. U der hec r' Ma re Ac f 1986, each far a re 🖲 ired calc la e a a al refere ce le el fa re «r d ci i «h «hae er , baiedb li»lighe ber faial he far 31 Dece ber 1986 bagie 'eh eha e'eara e er a cia ed iheacha i al ୶ ecie . Far iha a re:la dra i fle ha 125 kg f ୶ h 🐢 ha e øer hec are, r'defici far ', a d e far ere all ed i crea e a i al ber il ha le el a reached. Far i hara i f re ha 125 kg f øh øha e øer hec are c ld e ∉a d heir aciiie I b e e dig heir la darea reach he hre h ld f ra ferred I der ecific circ a ce (arriage, i heri a ce r ra fer f he e ire far), hich c raied b h he la d arke a dlie ckecrgr h. A f Ja ar 1994, heref re, a re 🖲 a ere all ed be raded a d de i a ed ' a re ୶ r d ci righ ′. A far ′ a re∳r d ci righ a diided i ∳ar ∶a la d-ba ed 125 kg f 🗚 🍬 ha e ፉ er hec are, a d a 🛛 -la d ba ed 🧌 a, 🛯 a, hich a ed calc la ed i h refere ce ecific a i al ca eg rie (rke, eig a d chicke). The la dui a a ade radable i hi a i al caegrie 🛛 🖛 ree frhericreae i ie ørd ci, hich a allegedl ca ig eri e ir e alørble. Tradigi a re ∳rd ci righ /a i al k∳lace hr gh br ker, b ra aci had be are ed brele a ger e a hriie e reha ørchaig far er had a aøør øria e a redioralola. The a reor d c i righ e , h e er, ere able crea e a bala ce be ee he er d ci a d die al fa i al a re. Theref re, i 1998, he Ne herla d G er e i r d ced he -called Mi eral Acc i g S e (MINAS), hich i e e iall a radable øer i aøør ach frirge a døh øhr aøølied a ferilizer. The e a##lie #ig, #lr, ied lie ckad ca le far ih ck rae ab e a e de i (i all, ab 50 ∉erce f all Ne herla d lie ck far ) a d arable far . MINAS far er are re<sup>®</sup> ired declare he i eral røl heir far , hereb he røl i e i aed a he differe ce be ee he l e f ir ge ad c ad a re.Far er e ceedig heir røl 🧯 a ca 'rade'b giige ce a re ha ha e reached heir 🖲 a . Th e e ceedig he 🖷 a are charged. A far a a 90 erce f far ea charge beca e he 🐢 l a re arable cr ୶ far ih ed a re cae aci.

MINAS did cceed i red cig rie e i i b i i øle e a i a e re el c øle.I a heref re ab li hed i 2006, f II i ga Oc ber 2003 deci i b he EU C r fJ ice a i g ha he Ne herla d G er e had failed i øle e cer ai ele e f he EU Nira e Direc i e a d ha he aøølica i li i f ra i al a re ere high.I Ja ar 2006, he Ne herla d ad ø ed a a re ø lic ba ed aøølica i ra her ha i eral I a dard.C ø ared i h MINAS, he e ø lic e ricer li i he e f ir ge a døh øh r.

Sources: Oe e a a d Bere e , 2005; Verb rg, 2009; W i k, 2003.

# 4.2.5. Pa men for en ironmen al er ice

Payment for environmental services (PES) schemes are an increasingly popular tool for increasing positive externalities generated by agricultural production systems, including livestock. PES schemes provide incentives/compensate farmers for the production of

mote application of PES programmes at the country level is a daunting task, sometimes because of the existence of several agro-ecological zones and different livestock production systems.

### Bo 55. A SILVOPASTORAL PES SYSTEM IN NICARAGUA

are la d- e hereb ree a d/r hr b are c Sil 🗖 a hied ih ral ρ е ¢a re∉rdci frlie ck.Thee e are e ୶ ec ed ge era e ec ic be efi frfar er,i.e. i crea ed bi a a ailabili, lie ckørd cii a dh eh ldic e, ella e ir e albe efi fr cie i.e. red ced il er i , bi di er i c era d carb fia i il a d a dig ree. I he Maig -R Blac area f a i Nicarag a, a W rld Ba k Gl bal E ir e Facili er jec ha a e e ed e c rage he ad  $\phi$  i fil  $\phi$ a ral  $\phi$ racice b lie ck far er i degraded  $\phi$ a re area. The ✓r iec ha de el ✓ed 28 i dice f carb e⊛ e rai ad bidieri c er a i a cia ed i h differe e fla d e. The ei dice are aggrega ed i a i glee ie al erice i de (ESI) freach far. Far er aregie a e-i e ୶ a e a a r ice ie ji heørgra eadare he cøe aedfra øiiechage i he al ESI c re f heir far . The ୶ jec ar ed i 2004 a d, af er е ear' , erai re ha 17 erce fall far i he regi had ade e chage i la de, i cldi a he ig fiør ed grae i degraded øa re,øla ig high-de i ree ad a de ablihigfdderbak.

FII i g ør jec i øle e a i , he area f degraded øa re decrea ed b re ha half a d ha ela ed a al cre fell b al e hird. I i be ed ha. - rh ehld c er ed a a erage area al herea d ble ha f 🐢 🛛 r eh ld, ø r far er rec rded he large ør ø r i al cha ge i ESI ø i beca e e all edfr liølelad-eøi, e f hich ere areali g he er gra rce-ø r h eh ld. re

Sources: Pagi la et al., 2007; Pfaff et al., 2000.

### 4.2.6. Marke ing of en ironmen al good

Livestock production systems generate multiple outputs, including animal food, manure, draught power, and both positive and negative environmental externalities. As a general rule, markets exist only for meat, milk and other livestock products such as skins and leather, which leads farmers to overlook their other livestock outputs. Public actions to create a market for some of the environment goods/services associated with livestock farming – such as wildlife protection or biogas – could well provide incentives for farmers to shift towards more environment-friendly husbandry practices (Boyd  $e_a'$ ., 1999; Drummond  $e_a'$ ., 2007; Suyanto  $e_a'$ ., 2005). Setting up a market for livestock-related environmental goods and services involves the following:

 Identifying opportunities for market-based livestock-environment development, i.e. areas where a market may develop for by-products generated by livestock farming. For example, would ecotourism enterprises flourish if wildlife were protected? Are there any potential buyers for the biogas produced by animal waste?

- Analysing major livestock production systems to ascertain whether markets for livestock by-products are as remunerative for farmers, if not more so, than markets for traditional livestock products. This is a precondition for the feasibility of any marketbased livestock-environment scheme.
- Providing public goods necessary to ensure the smooth and fair functioning of a market for livestock-related environmental by-products, such as information campaigns; infrastructure development; and ad hoc rules and regulations governing the newly established market.
- Promoting a participatory process to help livestock farmers: (i) adjust their husbandry
  practices to produce identified livestock-environment-related goods, including technical and financial assistance; and (ii) sell the livestock by-products they produce.

The following issues should be considered when designing and implementing livestockenvironment market-based programmes:

- Identifying and measuring the prospective costs and benefits for farmers to produce and market livestock by-products is a challenging task owing to the lack of benchmark data.
- A market for environmental goods, and in particular for livestock-associated environmental goods/services, might be difficult to develop in many developing countries, either because the environment is poorly valued (e.g. people are not willing to pay for access to natural reserves) or because there is little demand for non-food livestock items (e.g. biogas).



- The production and sale of some livestock by-products may require relatively high technical (i.e. for biogas) and managerial (i.e. for natural parks) skills on the part of farmers and, not least, significant investments. Therefore, unless adequate external support is available, smallholders may be unable to participate in and benefit from market-based livestock-environment schemes.
- National and local governments may lack the capacity/willingness to support the establishment of a market for livestock-related environmental goods. This is because benefits for the public sector are largely indirect and materialize only in the medium to long term. In effect, in most cases, donors have sustained the establishment of markets for environmental goods.

### Bo 56. BIOGAS PROCESSING FOR SMALL-SCALE FARMERS IN CHINA

The racid e ca i flie ckørdci ø ea ber f challe ge i er fae di 🖉 al, ୶ ar ic larl i ra 🕫 idl gr i g A ia c rie . The Ec - Far i g Pr jec f r Chi a, la chedii lae 2008 ih Wirld Bak 🐢 r, ai qeeraee ir ealadechei egrai fbigai far ig a dr ralh ehldc kig. There ic be efi fr are hree c 🕐 e he ୶ jec. (a) The i egra ed ec -far i g е с • e arge ab 400 000 500 000 far er i Ahi, Ch g<sup>o</sup>ig, Gai, Hbeiad Ha hele he i egra e bi ga i li e ck far i g; i e ar ic lar, be eficiar h eh ld . hich are re@ ired (0.13 ha) fcr øla d, recei e øø r bild biga e ha i cl de dige er (8 10 <sup>3</sup> i ize), qa c llec r, eiee, qa e rifier a d e. (b) The ech ical e e i a d bi qa er ice e c 🔹 e ai reghe a de øa de i igr rale erg a dagric Iral eei er ice а er ide echical en r f r he era i a d ai e a ce f e.(c)The hird c ≠ e f heør jecha d i h a age e a dM&E. bi ga The e reced direc be efi f biga ech l g relae : (i) e erg r d c i , a biga ca be ed a a felaleraie da dil; (ii) agric I ral ୶ r d cii, a he I dge fr he biga reac ri ra fredi a ia ir ge; a d(iii) e ir e alør eci, a here illbeared ci i gree hee i i a dbe er a i ar c di i . The fir be efi ge era ei edia e a ig frfar er i er fred ced e 🕫 di re f el a d fer ilizer. Achie e e f he 🖝 jec' de el 🐢 e bjec i e ill i red hr ghe ir e alidicar; ea ree fh eh ld liigc dihe i ;chage i hehlde, e di read labr aig;ad i (red haad i i i alcaøaci.

Source: W rld Ba k, 2008c.

### 4.2.7. En ironmen al a e

Environmental taxes, such as grazing or discharge taxes, translate the costs of environmental pollution/resource scarcity into appropriate monetary costs, thereby providing farmers (the polluters) with incentives (taxes) to contain the negative impacts of livestock produc-
tion systems on the environment. At the same time, they generate additional revenue for government, which may be used for environmental programmes or the supply of other public goods. There exist countless livestock-environment taxes, which differ in terms of

investments/programmes. Should this not be the case, taxes may shift the adverse impacts of livestock pollution to different compartments of the ecological system (e.g. an environmental tax to avoid overgrazing may lead to livestock being moved to areas where the tax is not levied).

## Bo 57. GRAZING TAX IN SOUTHERN MALI

I he S da -G i earegi f Mali, li e ckarebha ajr rce free eada aigae, adai al raci i ake i 🐢 frcr 🐢 rdci . Se le e de iie, d 41 øer a d 28 30 r øical li e ck i (TLU = 250 kg h e er, ha e reached ar lie eigh) øer 🖲 are kil ere, hich crea e ac e øre re bhc 🔹 re a d cr 🐢 i g la d. I 🐢 ar ic lar, a i al a e lef 🛛 🐢 e -acce 🐢 a re are der i i g il ferili a d degradig he grazig area, ih ega ie ce frfar er lielih d.laae 🖌 red ce ୶ redegradai, i 1998, he Gere ird ced a e øeri e algrazig a i e area i he rder f FCFA 1 000 (aøør i a el US\$2) red ce here re flie ck he la d. A reli i ar a e е f he grazi g a i dica e ha hile here ha bee red ci i ckiq de i i e area ig helack faleraiefeed rceadlabr 🐢 riie i her, lie ck far er ha e c fied heira i al a di ør ed heirh ba dr øracice. Thi ha led i crea ed li e ck ୶ d c i i , grea er a ailabili f rga ic fer ilizer a d higher cr 🖸 ield . I 🖸 ar ic lar, i ha bee h ha , er a 15- ear 🖉 eri d, free grazi g с la dre aied rea racie far er ha lab r-a dcarial-ie ie e.H e er, i area here feed i a ailable, a rela i el l ୶ a re a cfiee i a fficie i ce i e f r far er cha ge heir h ba dr øracice. Thi i beca e c fieeraiehe 🖸 flieckadcr 🧖, ihherel haheec fhea re ha c 🐢 e a ed frbicrea ed 🐢 al e. i i

Source: M a gi, 2006.

## Reference

- Adam D.W., Graham D.H. and Von Pi chke J.D. (ed .) (1984) U de: i i g R. a' De, e' e i h Chea C:edi. Westview Press, Boulder, Colorado, USA.
- Adam M., Sibanda S. and T rner S. (1999) Land Tenure Reform and Rural Livelihoods in Southern Africa. ODI Nav. :a Revul :ce Pe: ec \ e, 39.
- **ADF** (2006) *U* i ed  $Re \bowtie b'$ ic f Ta a ia.  $L \bowtie e$  c Mar e i g Pr ec C /e i Re r. African Development Fund, African Development Bank, Tunis.
- Adler M. (2001) Village Banks in Mali.  $D+CD \in e^{i}$   $e^{i}$   $e^{i}$   $a^{i}$   $d^{i}$  C  $e^{i}a^{i}$   $i^{i}$ , 1: 18-20.
- Ah ja V. and Redmond E. (2001) Ec ic a  $d P \mid ic I \lor e i L \not k e c Set ice Det \not k e:$ he P :: Background paper for the FAO PPLPI Initiative. FAO, Rome.
- **Aklil J., Ir ng P. and Reda A.** (2002) *A AL di f he 比 e c Ma: e i g S aL i Ke a*, *E hi ia a d S*. *da* . Pan African Programme for the Control of Epizootics (PACE), Study, Nairobi, Organization of Africa Unity/Interafrican Bureau for Animal Resources, Nairobi.
- **Aklil J. and Weke a M.** (2001)  $\mathcal{U}_{i}$   $e c a d \mathcal{U}_{i}$  e'ih d i E erge cie : Le Lear frhe 1999-2001 E erge c Re e i he Pa ra' Sec r i Ke a. Working Paper No. 3.Feinstein International Famine Centre, Medford, Massachusetts, USA.
- Al on J.M., Chan-Kang C., Marra M.C., Parde P.G. and W a T.J. (2000) *A e a*-*a a i f he :a e f :e L i agrit /u :a R&D: E ede He:t /e* . IFPRI Research Report No. 113. IFPRI, Washington, DC.
- Al on J.M., Freebairn J.W. and Jame J.S. (2003) Distributional Issues in Check-off Funded Programs. Agrible i e : A I er a i a JNC r a , 19 (3): 277-288.
- Al on J.M., Freebairn J.W. and Jame J.S. (2004) Levy-funded research choices by producers and society. Al.  $a_i$  ia J.N.  $a_i$  f Agriet N.  $a_i$  a d Re. N. ce Ec ci, 48(1): 33-64.
- Ander on K. and Mar in W. (ed .) (2006) Agrite in Trade Ref : a d he D ha De e' e Age da. Palgrave Macmillan, New York and World Bank, Washington, DC.
- **ASARECA** (2005) *ASARECA' S :a egic Pla 2006-2015. Agrite hural Re earch-f :-Del el e i Ea er a d Ce :a Africa.* ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa), Entebbe.
- A opa V.N. and Bee G. (1997) Ma age e f Agriet lural Reearch: A Trai i g Manual. Melle 1: I in i al Agriet lural Reearch: Orga i a i a d Ma age e . FAO, Rome.
- A iiR. (2007) *M* a binue: Ag:int inter Press Service News Agency, 10 August, Maputo.
- Au ba-M oke R.C. (2001) Challe ge Cha ge f he Dekter f Lt e c Sett ice i Africa U i g Uga da a a M del. Proceedings of the 10th Conference of the Association of Institutions for Tropical Veterinary Medicine, Livestock Community and Environment, Copenhagen.
- **Bai h a M.** (2009) Taking Information and Communication Technology to the rural masses. *The A a Tribl. e,* 27 September.

**Banerjee A.V., Ger ler P.J. and Gha ak M.** (2002) Empowerment and Efficiency: Tenancy Reform in West Bengal.  $J \mathbf{u} \neq \mathbf{a}' + f P | i i c \mathbf{a}' E c$ , 110(2): 239-280.

BGV

- **Canada, Go ernmen of** (2002) Canadian Beef Cattle Research, Market Development and Promotion Agency. *Ca ada Ga e e*, 3, 30 January.
- **Care R.** (2001) Institutional Arrangements and Public Agricultural Research in Canada. *R ie f Agricultural Research in Canada. R ie ic* , 23(1): 82-101.
- Carne C., Gill G.J. and Pal S. (2000) *I* ::'\ *i* g c e *i* \ *i* e ag:*i*€. / ℓ. / a / / e earch ℓ€ di g *i I dia*. Policy Brief No. 12, National Centre for Agricultural Economics and Policy Research, New Delhi.
- **Ca a eda T.** (1998) The de ig, i |e|e|a i a d i ac f f d a ; g;a i de e|-i g c i g c i e . Unpublished paper, World Bank, Washington, DC.
- **Ca elo M.A. and Co ale A. C.** (2008) C *iac far i g a d her are i i***L** *i a echa i f r i egra i g a ||h|/der ||i| e c r e L cer i he gr h a d de e' e f he |ii e c e c r i de e' i g c L rie . PPLPI Research Report No. 45, FAO, Rome.*
- **CDC** (1998) Rift Valley Fever East Africa, 1997-1998. *M* : a<sup>*i*</sup> a *d M* : b*i* d*i* Wee *Re* : , 47(13): 261-264.
- **CEESP** (2002) Sustainable Livelihoods and Co-management of Natural Resources. *P ic Ma e:* 10.
- **Chao-Beroff R., Cao TH., Vandenbro cke J-P., M inga M., Tiaro E. and M e a ira L.** (2000) A C  $a:a \not | e A a' i Of Me be:-Ba ed Mic: fi a ce i \not i I Ea A d We Af:ica. MicroSave Research Paper. MicroSave, Nairobi.$
- **Chapman R. and Tripp R.** (2002) *Ca e Su die f Agrite*  $|u_i ra'| E e i Pr gra e U i g <math>P_i M_i$  *a i ed Se* $M_i$  *ice Pr* $M_i$  *i i*. Agricultural Research and Extension Network, UK.
- **Chema S., Gilber E. and Ro eboom J.** (2003) A Critical Relate f Ke  $I \in e$  a d Rece E erie ce i Ref r i g Agritule ral Re earch i Africa. ISNAR Research Report No. 24, The Hague.
- **Coe**  $_{\mathbf{W}}$ ee **G.**, **Kabb** cho K. and Njema A. (2003) *Ta i g Ba i g Se* $_{\mathbf{N}}^{\mathbf{H}}$  *ice he Pe*  $_{\mathbf{e}: \mathbf{E} \mathbf{W}}$  *i ' M bi* $_{\mathbf{e}}^{i}$ *e Ba i g U i*. MicroSave Research Paper. MicroSave, Nairobi.
- **Coffe E.** (1998) *Ag:ite. Ag: ite a ce: Ge i g he P icie Righ*. Agricultural Finance Revisited No. 2. FAO, Rome.
- **Colman D. and Yo ng T.** (1989) *P.i ci*  $e f Ag:int interval Ec ic. Ma: e a d P.ice i Le <math>Da_i^{t}e^{t} e d C n$ . *i.e.* Cambridge University Press, Cambridge, UK.
- COMESA (2008) C di -ba ed Trade i bli e c Pr eL c . Ne O →L i ie f r bli e c Trade i he COMESA Regi . Policy Brief No. 1, COMESA (Common Market for Eastern and Southern Africa), Lusaka.
- **Confor i P.** (2004) *Price Tra i i i Selec ed Agrie Mare*. FAO Commodity and Trade Policy Research Working Paper No. 7. FAO, Rome.
- **Conro C.** (2005) *Pa; ici a : L k e c Re ea.ch. a* **@** *ide*. Intermediate Technology Development Group, London.
- **Conro C., Thak r Y. and Vadher M.** (2002) The efficacy of participatory development of technologies: experiences with resource-poor goat-keepers in India.  $D_{k}^{*} e c Re earch i R rad D_{k}^{*} e' e , 14(3).$
- **Co ale A.C., Son N.T., Lapar L.M. and Tiongco M.** (2006) *S* a, *h de: c* ac fair ig f i e i N thet Vie Na : e a d cale f t e c i . PPLPI Research Report 06-11, FAO, Rome.
- **Co I er J. and On mah G.** (2002) The role of warehouse receipt systems in enhanced commodity marketing and rural livelihoods in Africa. F = d P / ic, 27(4): 319-337.

- **Coller J. and Shepherd A.W.** (1995) *I* || *e* : *Ciedi* : *A* : *A* : *ach* : *d* || *e* | *i* : *g* : *agrite* |-• *L*::*a* | *ar* : *e* : Agricultural Services Bulletin No. 120, FAO, Rome.
- **CTA** (2005) *Ma:* e *I* f *i* a *i S* e a *d Agrite* |*i L ia*| *C di E cha ge* : *S i e g he i g Ma:* e *Sig* a<sup>*i*</sup> a *d I i k i* . CTA Expert Consultation, Synthesis Report, Technical Centre for Agricultural and Rural Cooperation, Wageningen, Netherlands.
- **C rran M.M. and MacLeho e H.G.** (2002) Community Animal Health Services for Improving Household Wealth Status of Low-Income Farmers. *Tr ical A i al Heal h a d Pr eL c i ,* 34(6): 449-470.
- **DAC** (2007a) Quide<sup>1</sup>*i* e *f i* ad *i i ei g* **u** *b id* **u** *dei agiic*<sup>1</sup>*i i c ce i e che e* (*ACABC*). Department of Agriculture & Cooperation. Ministry of Agriculture, Government of India, New Delhi.
- **DAC** (2007b) O era i a guide, i e f SFAC che e f r agrillu i e r ec de e e . Department of Agriculture & Cooperation. Ministry of Agriculture, Government of India, New Delhi.

**Dairy Mail Africa** (2007a) Smallholder Development – Milk Report. *Dai: Mail Africa*, January. **Dairy Mail Africa** (2007b) Focus on Uganda. *Dai: Mail Africa*, December.

- **Da id P.A. and Hall B.H.** (2006) Introduction. Property and the pursuit of knowledge: IPR issues affecting scientific research. *Re ea:ch P* /*ic* , 35: 767-771.
- **Deardorff A.V.** (2006)  $G'_i$  a: f I e:  $a i a'_i Ec$  ic . World Scientific Publishing, London.
- **Deininger K.** (2001) Negotiated Land Reform as One Way of Land Access: Experiences from Colombia, Brazil and South Africa. *I* de Janvry A., Gordillo G., Platteau J.P. and Sadoulet E. (eds.) Acce La d,  $\mathbb{R}$  :  $a' P \lor e^{i}$ ,  $a d \mathbb{R}$  b' ic Ac i. Oxford University Press, Oxford, UK.
- Deininger K., Ca agnini R. and Gon⊌ le M. (2004) C arig La d Ref r a d La d Mar e i C | bia: I ac EN. i a d Efficie c . World Bank Policy Research Working Paper No. 3258. Washington, DC.
- **Delgado C., Ro engran M., S einfeld H., Eh i S. and Co rboi C.** (1999)  $\mathcal{L}_{i} e c$  2020: The Ne Re i . Food, Agriculture, and the Environment Discussion Paper No. 28, IFPRI, Washington, DC.
- de Haan C., an Veeb T.S., Brandenb rg B., Ga hier G., Le Gall F., Mearn R. and Simeon **M.** (2001)  $\mathcal{U}_{i}$  e c  $D \notin e^{i}$  e . I lica i f  $\mathcal{I} \otimes \mathcal{I}_{i}$  lica i f  $\mathcal{I} \otimes \mathcal{I}_{i}$  he  $\mathcal{E} \wedge i$  i e , a d  $\mathcal{G}_{i}$  ball  $\mathcal{F}$  d Set  $\mathcal{I}_{i}$  . World Bank, Washington, DC.
- De Jan r A., Ke N. and Sado le E. (1997) Ag/it / ↓ /a/ a d t /a/ dt e e /ic i La i A e/ica. Ne di/ec i a d e challe ge . FAO Agricultural Policy and Economic Development Series No. 2, FAO, Rome.
- **de So o H.** (2000) The M e: f Ca i a<sup>'</sup>. Wh Ca i a<sup>'</sup>i TML h i he We a d Fai<sup>'</sup> A<sup>'</sup> e-: he:e E<sup>'</sup> e. Basic Books, New York.
- **Dinar A.** (1996) Extension commercialization: how much to charge for extension services? A erica  $J \in \mathcal{A}$  if Ag if Ag if  $a \in \mathcal{A}$  ic , 78:1-12.
- **Dor ard A., K dd J., Morri on J. and Ure I.** (2004a) A Policy Agenda for Pro-poor Agricultural Growth. W : d D = e' = e, 32(1): 73-89.
- Dor ard A., Fan S., K dd J., Lofgren H., Morri on J., Po I on C., Rao N., Smi h L., Tchale

**H., Thora S., Ure I. and Wob P.** (2004b) Institutions and Policies for Pro-poor Agricultural Growth.  $D \not\in e' e P \mid ic R \not\in ie$ , 22(6): 611-622.

- **Dor ard A., K dd J. and Po I on C.** (2006) *Tradi i al D e ic Mar e i g S e f r Agri-* $\mathbf{t}_{a} = \mathbf{t}_{a} = \mathbf{t}_{a} = \mathbf{t}_{a} = \mathbf{t}_{a}$ . Background Paper for the World Bank World Development Report 2008. Imperial College, London.
- **Dr cker A.G. and La ac<sub>4</sub>-Lohmann U.** (2003) Getting Incentives Right? A Comparative Analysis of Policy Instruments for Livestock Waste Pollution Abatement in Yucatán, Mexico. E i : -e a d D a e' e E c i c, 8: 261-284.
- **Dr mmond D, Caranci B. and T lk D.** (2007) *Ma:* e -*Ba ed S*  $\bigstar$  *i P:* ec *he E*  $\bigstar$  *i: e* . Economics: Special Report, TD Financial Group, Toronto, Canada.
- **D** for **B.** and Hendrik **P.** (2009) *E* ide  $i \mid gica \mid \mathbf{u} \mid \mathbf{k} \in i \mid a \in i a$  i  $a \mid hea \mid h$ . CIRAD, Paris; FAO, Rome; OIE, Paris; AEEMA, Maisons-Alfort.
- **D** ncan **A**. and Jone **S**. (1993) Agricultural marketing and pricing reform: A review of experience. W d d D e e' = 21(9): 1495-1514.
- **Ea on C. and Shepherd. A.** (2001) *C* are *Fai i g*: *Pai e*: *hi f i G*: *h*. Agricultural Services Bulletin No. 145, FAO, Rome.
- **Eche err a R.G.** (1998)  $W_{i}^{''}$  C  $e i \leq e$  di  $g \mid f \leq he$  he Perf f a ce f Agriet  $|h_{i}| = |h_{i}|$ Re earch? Discussion Paper 98-16, ISNAR, The Hague.
- Eh i S.K., Ahmed M.M., Gebremedhin B., Benin S.E., Nin Pra A. and Lapar Ma.L. (2003) 10 ear  $fL_{i}^{k} e c P | ic A a_{i}^{k} i . P | icie f r i r i g r ol c k i , c e i k e e a d$  $<math>\lambda a_{i}^{k} a_{i}^{k} b_{i}^{k} e^{ih} d f a_{i}^{k} h | der k e c r ol cer. ILRI, Nairobi.$
- Elli F. (1992) Agriet Acria P licie i De e i g C C. rie. Cambridge University Press, Cambridge, UK.
- **Engel J.E. and Sardar an G.** (2006) Det e' *i g he F d* **g**. *| Chai i A: e ia.* Paper presented at the 98th EAAE Seminar 'Marketing dynamics within the global trading system: new perspectives', Crete, June-July.
- **EU** (2007) Commission Regulation (EC) No.1410/2007 fixing the export refunds on pigmeat. Official JNL r al f he L r ea U i , L 312/21.
- **E nj ng Cha A.** (2007) Pig Disease in China Worries the World. *The Wa hi g P*, 16 September.
- **FAO** (1999)  $Ma \mathbf{k} \mathbf{a}^{\dagger}$  he Pre ara i f Na i  $\mathbf{a}^{\dagger} A$  i  $\mathbf{a}^{\dagger} D$  i ea e E erge c Pre ared e  $P_{i}a$  . FAO, Rome.

FAO (2002a) Ge de: a d Acce La d. FAO Land Tenure Studies No. 4. FAO, Rome.

FAO (2002b) La d Te w re a d R ra' Del e' e . FAO Land Tenure Studies No. 3. FAO, Rome.
FAO (2004) The Pri i f Set ice he Lt e c Sec r. Background Paper for FAO Committee on Commodity Problems. Twentieth Session. Winnipeg, Canada.

FAO (2006) 🖄 e c Re / 2006. FAO, Rome.

- **FAO** (2007a) *Ma age e f :a i ib*, *e gif : e ce ha*, *a hie i*, h, *e c feed a d feedi g. C*, *L*: *e Ma*, *a*, FAO, Rome.
- FAO (2007b) The Sae fF dad Agrie, N. :e 2007. Paig Fa: e: f: E\\i: e a Se\\ ice . FAO, Rome.
- FAO (2008) L<sup>A</sup> e c P / ic a d P<sup>A</sup> e: Red c i . Livestock Policy Brief 04. Animal Production and Health Division, FAO, Rome.

**FAO** (2009) *Li i g fa: e: a: e . C e:a* ⅓ e *i age*. www.fao.org/ag/ags/ subjects/en/ agmarket/linkages/coops.html.

Fa i-Fehri M.M. and Bakko ri M. (1995)

- **Haro G., Do o G. and McPeak J.** (2005) Linkages Between Community, Environmental, and Conflict Management: Experiences from Northern Kenya.  $W \stackrel{!}{,} d D \stackrel{\bullet}{=} e^{\prime}$ , 33(2): 285-299.
- Ha mann R. and Rodrik R. (2003) Economic Development as Self-Discovery. Jut r a' f D = e' ee Ec ic, 72(2): 603-633.
- Hakell P. (1999) Public Policy and Drought Management in Agropastoral Systems. *I* McCarthy N., Swallow B., Kirk M. and Hazell P. (eds.), *Pr* er right, ri, a difference of the eric Africa, IFPRI, Washington, DC. and ILRI, Nairobi.
- Ha<sub>k</sub>ell P. and Skee J.R. (2006) Insuring against bad weather. Recent thinking. *I* Radhakrishna R., Rao S. K., Mahendra Dev S. and Subbarao K. (eds.), *I dia i a G<sup>i</sup> ba<sup>i</sup> i g W <sup>i</sup>/d: S e A ec f Mac<sup>+</sup> ec , Ag<sup>i</sup>/d. /e, a d P<sup>+</sup>/e<sup>-</sup> .* Academic Foundation, New Delhi and Centre for Economic and Social Studies (CESS) Hyderabad.
- Hea h B. (2001) The Fea ibili f E ab<sup>i</sup> i hi g C -ca<sup>i</sup> f Ca P<sup>i</sup> a e Ra che a a D<sup>i</sup> gh Mi iga i Mean. ie . Report for the Natural Resources Institute, Greenwich, UK.
- Hea h S.E., Ken on S.J. and Zepeda Sein C.A. (1999) Emergency Management of Disasters Involving Livestock In Developing Countries. Ref. ci. ech. Off. i . E i ., 18(1): 256-271.
- **Heffernan C. and R h on J.** (2000) Re-stocking: A Critical Evaluation. *N adic Pe /e*, 4(1).
- **Heffernan C., Mi** relli F. and Niel en L. (2001) *Re-*  $c i g a d P \downarrow e: A_{i}^{'} \downarrow i a i$  *Percei*  $a d Rea_{i}^{i} i e f L \downarrow e c$ -*Kee* i g A g P: *Pa*:  $a_{i}^{i} i i Ke a$ . Veterinary Epidemiology and Economics Research Unit, University of Reading, Reading, UK.
- **Hill P.** (1966) Landlords and brokers: A West Africa Trading System (with a Note on Kumasi Butchers). *Cahie: d'e***.** *de af:icai e*, 6(23): 349-366.
- Hoff K. and S igli ⊌ J. (1990) Imperfect Information and Rural Credit Markets Puzzles and Policy Perspectives. W d Ba Ec ic R ie, 4(2): 235-250.
- Hollo a G., Nichol on C. and Delgado C. (1999) Ag;  $i \in A$   $ia^{\dagger}i = i + A$  ghi = h,  $a = a^{\dagger}i = a^{\dagger}i$
- **Ho hanni an V., Ur an V. and D nn D.** (2004) *The R* i *e f C e.a* i *e i Mi Ma: e i g: The Ca e f A: e ia.* Paper presented at the 14th Annual IAMA World Food Forum and Agribusiness Symposium, Montreux, Switzerland, 12-15 June.
- IDL (2003) C V. *i -ba ed a i a' hea' h r er : hrea r i* . N. *i ?* The IDL Group, Crewkerne, UK.
- IFAD (1997) Fede;a, Ren. b, ic f B ia a d He; eg \ia Fa; Rec n. c i P; ec Rec i g Ac\(iie (408-BA) - I e;i E\(a\) a i E end \(i e SL a; . IFAD, Rome.
- IFAD (1999) IFAD' Re- c i g P: ec . IFAD, Rome.
- **IFCN** (2004) *IFCN Dai: Re : 2004.* International Farm Comparison Network, Brunswick, Germany.
- ILRI (1995) 𝔼 e c P ¦ic A a' i. ILRI Training Manual No. 2. International Livestock Research Institute (ILRI), Nairobi.
- **I a r G. and Ma I.** (2008) *The Ea.*? *E e.ie ce i h B.a che Ba i g.* CGAP Focus Note No. 46. CGAP, Washington, DC.
- Jabbar M., Benin S., Gabre-Madhin E. and Pa lo Z. (2008) Market Institutions and Transaction Costs Influencing Trader Performance in Live Animals Marketing in Rural Ethiopian Markets. July: a f Africa Ec ie , 17(5): 747-764.

- Jacob H.G. and Min en B. (2007) Is Land Titling in sub-Saharan Africa Cost-Effective? Evidence from Madagascar. W . d Ba Ec ic Rel ie , 21(3) 461-485.
- Jame A.D. and Up on M. (1995) Cost Recovery of Veterinary Services. JN. ; a fI e: a i a Fa: Ma age e , 1: 125-133.
- Jan en W. (1998) Alternative Funding Mechanisms: How Changes in the Public Sector Affect Agricultural Research. *I* Tabor S.R., Janssen, W. and Bruneau, H. (eds.), *Fi a ci g Agricultural Re earch: A Surceb*. ISNAR, The Hague.
- Jar i L. (1986) Life c De e i La i A erica. World Bank, Washington, DC.
- Ka agoe T. (1999) Ag:ite. |u.;a| La d Ref : i P a: Ja a : E e:ie ce a d I u. e . World Bank Policy Research Working Paper No. 2111. World Bank, Washington, DC.
- Ke N., Sado le E. and de Jan r A. (2000) Transaction costs and agricultural household supply response. A erica JN  $r = a^{\dagger} f Agriet | N ra^{\dagger} Ec$  ic, 82(2): 245-269.
- Ke nian G., Olin M. and Dinar A. (1997) Cofinanced Public Extension in Nicaragua. W = dBa Re earch Ob et er, 12(2): 225-247.
- Khanna R.M. (2007) 25 per cent subsidy for setting up Agriclinics. *The Trib.* e, 12 March, Chandigarh, India.
- Kherallah M., Delgado C., Gabre-Madhin E., Mino N. and John on M. (2000) The R ad Half T려, elled: Agrie laural Mar e Ref r i & b-Sahara Africa. Food Policy Report. IFPRI, Washington, DC.
- Kidani A.B. (2007) Livestock Trade in Darfur. & da Vi i , 23 April.
- **Klerk L. and Lee i C.** (2008) Institutionalizing end-user demand steering in agricultural R&D: Farmer levy funding of R&D in the Netherlands. *Re ea.ch*  $P \mid ic$ , 37(3): 460-472.
- Knip V. (2005) Det e i g C N. *i* ie a d he G ba Dai: Sec : Pa: I: G ba O, et ie . PPLPI Research Report No. 31, FAO, Rome.
- Konaka S. (1997) The Samburu Livestock Market in NorthCentral Kenya. Africa S. d M gra h , 18(3-4): 137-155.
- **Kremer M. and Z ane A.P.** (2005) Encouraging Private Sector Research for Tropical Agriculture. W d d d e' e, 33(1): 87-105.
- K mar A., Nair A., Par on A. and Urdapille a E. (2006) *E* a di g Ba Q. reach hru. gh Re al Par er hi . C rre de Ba i g i Bra l. Working Paper No. 85, World Bank, Washington, DC.
- **K r p M.P.G.** (2002) Package of improved livestock services through cooperatives: a case study of the Mahsana District Milk Producers' Union Ltd., Gujarat, India. *I* Rangnekar D. and Thorpe W., *S* a, *h ie a d c i a d a i e i g*. **N** *ie a d c ia*. Proceedings of a South-South workshop held at the National Dairy Development Board (NDDB), 13-16 March 2001, Anand, India.
- **Lacroi R. and Varangi P.** (1996) Using Warehouse Receipts in Developing and Transition Economies. *Fi a ce & De*,  $e' = e^{-1}$ , 33(3): 36-39.
- Lai K.C. and Ci Ili V. (2005) Dece :ali ed Del el e i Agrie. A Ol el ie . Easypol Module 012 Thematic Overview. FAO, Rome.

- **Landell-Mill N. and Porra I.** (2002)  $S_{n}^{A} \in \mathcal{F}$   $[f \in \mathcal{F}] \cap G$   $[d? A \in G]$   $ba' R_{n}^{A}$   $ie f Mar e f r F re E^{A}$   $ir e a' Se^{A}$  ice a d Their I ac he P r. Instruments for Sustainable Private Sector Forestry Series, IEED (International Institute for Environment and Development), London.
- Lar on D.F., Ander on J.K. and Varangi P. (2004) Policies on Managing Risks in Agricultural Markets. W d Ba Re earch Ob et er, 19(2): 199-230.
- **Lek mono C.S. and Yo ng J.** (2002) Community-based animal health workers and institutional change: the DELIVERI Project in Indonesia. *PLI N e*, 45:13-16.
- Lele U., Le er W. and Hor ko e-We eler G. (ed.) (2000) I elleou al Prer Righ i Agrie la re. The World Barr R lei A i ig Brancera d Me ber Cau rie. World Bank, Washington, DC.
- **LID** (Livestock in Development) (1999).  $L_{i}^{k} e c i P \in e' F \in e d D \in e' e$ . Livestock in Development, Crewkerne, UK.
- L man T.R., I a r G. and S a chen S. (2006) U e fage i bra chie ba i g f r he r: re ard, ri , a d regulai . CGAP Focus Note No. 38. CGAP, Washington, DC.
- **L** on **F.** (2003) Trader Associations and Urban Food Systems in Ghana: Institutionalist Approaches to Understanding Urban Collective Action. I = a i a J + c i a f U + b a a d Regi a Re earch, (27)1: 11-23.
- **Mallick M.** (2007) Malawi's mobile banks reach rural communities. Africa  $R \notin ie$  f **B**.  $i \in a \ d \ Tech \ g, 43(8)$ .
- **Mapi e N.** (2008) *B a a' f d-a d-* **v.** *h di ea e a d beef :ade /ic*. Trans-boundary animal disease and market access for Southern Africa, Working Paper No. 3, IDS, Brighton, UK.
- **McDonnell P.J.** (2006) Argentina bans beef exports. L A ge e Ti e , 11 March.
- **McLeod A. and Le lie J.** (2001) *S ci -ec ic i ac f freed fr if e c di ea e a d e r r i i de*  $e^{i}$  *i g c L rie*. Livestock Policy Discussion Paper No. 3, FAO, Rome.
- **Mearn , R.** (1997) Livestock and environment: potential for complementarity.  $W \neq d A i a' R \notin ie$  , 88: 2-14.
- **Miller M.J.** (ed) (2003) *C:edi Re* : i g S e a d he l e: a i a  $\stackrel{l}{E}$  . MIT Press, Cambridge, Massachusetts, USA.
- **Mi ra S. and Jo ling T.** (2009) *Agriet. A rai E r Re ric i : Weifare I lica i a d Trade Di ci li e .* IPC Position Paper Agricultural and Rural Development Policy Series. International Food & Agricultural Trade Policy Council, Washington, DC.
- **Mondragon H.** (2005) *C* / *bia: Agraria Ref : , fa e a d ge i e*. Land Research Action Network, www.landaction.org.
- **Mord ch J.** (2000) The Microfinance Schism.  $W : d D = e^{-1}$ , 28(4): 617-629.
- **Morri on P.S., M rra W. E. and Ngidandang D.** (2006) Promoting indigenous entrepreneurship through small-scale contract farming: the poultry sector in Sarawak, Malaysia. Si ga  $x = J \mathbf{u} \cdot \mathbf{a}_{i}^{T} f T$ : ical Ge g/a h, 27: 191-206.
- Morri on J. and Sarri A. (ed .) (2007) WTO  $w_i$  le f : agriet  $|w_i|$  e c a ible i h de e e . FAO, Rome.
- **Mor on J. and Bar on D.** (2002) De-stocking as a Drought-Mitigation Strategy: Clarifying Rationales and Answering Critiques. *Di a* e: , 26(3): 213-228.

**Mor on J., Bar on D., Collin on C. and Hea h B.** (2002a) C *a.i g D. u. gh Mi iga i I e i i he Pa*  $a^{i} b_{i}^{k} e c$  *Sec i*. Unpublished paper, Natural Resources Institute, Chatham,

- O ango, M., L k B., S aal S.J., Ken anj i M., Nj bi D. and Thorpe W. (1998) Dairy cooperatives and policy reform in Kenya: effects of livestock service and milk market liberalization. F d P /ic, 23(2): 173-185.
- **Paarlberg P.L., Sei** winger A.H. and Lee J.G. (2004) *Ec ica*<sup>*II*</sup> *De e: i ed* L *e c* Q. *a:- a i e Z e*. Paper presented at the Western Agricultural Economics Association Annual Meeting, Honululu.
- **Pagiola S., Arcena A. and Pla ai G.** (2005) Can payments for environmental services help reduce poverty? An exploration of the issues and the evidence to date from Latin America. W d d D d e' e, 33(2): 237-253.
- Pagiola S., Ram re₄ E., Gobbi J., de Haan C., Ibrahim M., M rg ei io E. and R ₄a J.P. (2007) Paying for environmental services of silvopastoral practices in Nicaragua. Ec / gica/ Ec ic, 64(2): 374-385.
- Pa on J. and C e a C.E. (2002) Outreach and financial sustainability of institutions. Outreach and sustainability of member-based rural financial intermediaries. *I* Zeller M. and Meyer R.L. (eds.), *The ria gle f icr fi a ce: fi a cial a cial a abili , a reach, a d i ac*. Johns Hopkins University Press, Baltimore and London.
- **Pearce D., Rein ch M., A**<sub>k</sub>**e edo J.P. and Brar A.** (2005) *Ca a L A de (B*  $\uparrow$  *ia) d i e: ifie i k. :a i e di g.* CGAP Agricultural Microfinance Case Study No. 3. CGAP, Washington, DC.
- **Peeling D. and Holden S.** (2004) The effectiveness of community-based animal health workers, for the poor, for communities and for public safety. *Ref. ci. ech. Off. i . E i .*, 23(1): 253-276.
- **Pe er R.** (2006) *R adb*, *c ref r*: *he er i e ce f agritt*, *M ra*, *e r*, *M b idie*. Policy Issues in International Trade and Commodities Study Series No. 32, UNCTAD, Geneva.
- **Pe er on E.B. and Orden D.** (2005) Effects of Tariffs and Sanitary Barriers on High- and Low-Value Poultry Trade. July:  $a_{i}^{\dagger} f Ag_{i}$  is  $a_{i}^{\dagger} a_{i}^{\dagger} a_{i}^{\dagger$
- **Pfaff, A., Kerr S., H ghe F., Li S., Sanche** G., Schimel D., To i J. and Wa on V. (2000) The Kyoto Protocol and payments for tropical forest: An interdisciplinary method for estimating carbon-offset supply and increasing the feasibility of a carbon market under the CDM.  $Ec \mid gica \mid Ec = ic$ , 35(2): 203-221.
- **Phiri G.** (2006) Forex Shortage Compounds Cattle Disease Outbreak. *Africa Ne Di e i*, 29 January.
- **Pica G., Pica-Ciamarra U. and O e J.** (2008) *The L* e c Sec i he W d d e e e Re i 2008: Rea e i g he P lic Pit i i e. PPLPI Research Report 08-07, FAO, Rome.
- Pica-Ciamarra U. (2004) Access to land through rental markets: a (counter-) evolution in the World Bank's policy? La d Ref : , 2: 8-20.
- **Pica-Ciamarra U.** (2005)  $L_{A}^{i}$  e c  $P_{i}^{i}$  icie f :  $P_{A}^{i}$  e:  $A_{i}^{i}$  e i i : The : a d P:ac ical  $A_{i}^{i}$  ide ce f: Af:ica, A ia a d La i A e:ica. PPLPI Working Paper No. 27, FAO, Rome.
- **Pica-Ciamarra U. and O e J.** (2008)  $A \ i \ a' Hea' h P | icie i Det e' i g C U ; ie : A Ret ie f O i . PPLPI Research Report 08-08, FAO, Rome.$
- **Pla ea J.P.** (2000a) Allocating and Enforcing Property Rights in Land: Informal versus Formal Mechanisms in Sub-Saharan Africa. *N* :*rdic J***u** : *a*<sup>1</sup> *f P* /*i ica*<sup>1</sup> *Ec* , 26(1): 55-81.
- Pla ea J.P. (2000b) C ℓ *i I e.fec i* . Paper delivered at the Annual (World) Bank Conference on Development Economics. Paris.

- **Rademaker M.F.L.** (2000) Agents of Trust: Business Associations in Agri-Food Supply Systems.  $I e: a i a_i^{T} F d a d Ag:ibil i e Ma age e Rel ie, 3(2): 139-153.$
- **Ra hore M.S.** (2005) *S a e L***a** e *A a i f D: u gh P licie a d I ac i Ra a ha , I dia.* Working Paper No. 93; Drought Series Paper No. 6. IWMI (International Water Management Institute), Colombo.
- **Reardon T. and Timmer C.P.** (2007) Transformation of Markets for Agricultural Output in Developing Countries since 1950: How has Thinking Changed? *I* Evenson R. and Pingali P. (eds.), Ha db  $f Agrine \int c_{in} c_{in} c_{in} dc_{in}$  ic , Vol. 3. Elsevier, North Holland, Netherlands.
- **Ri era W.M., Zijp W. and Ale G.** (2000) *C* ⇒*ac i g f* ≠ *E e i* . *R ie f E e*,*gi g P*,*ac*-*ice* . World Bank, Washington, DC.
- **Ro eboom J.** (2004) Agrite Intral re earch a d e e i tet di g let el rent ired ee he a i-he ger r gra e b ec t e. Consultancy Report to FAO, FAO, Rome.
- **Ro h F., Zin** ag **J., Orkhon D., Chimed-Ochir G., H** on **G., Co i i O., Carrin G. and O e J.** (2003) Human health benefits from livestock vaccination for brucellosis: case study.  $\mathbf{R}_{i} \parallel e i$ *f he W*  $d \mid d$  Heal *h O:ga i a i*, 81(12): 867-876.
- **Ro<sub>4</sub> cki V.** (2006) *Credi I f* r *a i S e f* r *Micr fi a* ce. *A F u da i f* r *fu r her I*  $\sqrt{a i}$  . Working Paper, Centre for Microfinance, Chennai, India.
- Sado le E., M rgai R. and de Jan r A. (1998) Acce /a d\ ia re a are . Paper presented at the FAO/WIDER Seminar on Access to Land, Rural Poverty and Public Action, April 1998. Santiago, Chile.
- **Safa ian M., Flei ing H. and S einb k J.** (2006) *U* / *c i g Dead Ca i a*. Public Policy for the Private Sector, Note 307, World Bank, Washington, DC.
- Samra J.S. (2004) Rª ie a d A a' i f D: gh M i ; i g, Dec'a;a i a d Ma age e i I dia. Working Paper No. 84; Drought Series Paper No. 2. International Water Management Institute (IWMI), Colombo.
- Sandford S. (1985) Be e: B e c P icie f : Africa. International Livestock Centre for Africa (ILCA), Nairobi.
- **SA-PPLPP** (2009) Delle e' e f Village I in i f : En i able a d a ai able Acce Nan ral Re norce . Good Practice Note SAGP18. South Asia Pro-poor Livestock Policy Programme, New Delhi.
- Schelling E., W K., Bechir M. Do mago m Mo o D. and Zin ag J. (2005) Synergy between public health and veterinary services to deliver human and animal health interventions in rural low income settings. *Bri i h Medica*  $J + c = a^{\dagger}$ , 331: 1263-1267.
- Schelling E., Bechir M., Abdo Ia e M.A., W K., Randolph T.F. and Zin ag J. (2007) Human and Animal Vaccination Delivery to Remote Nomadic Families, Chad. *E e.gi g I feci*N. *Di ea e*, 13(3): 373-378.
- **Shear P.** (2000) Communicable disease surveillance with limited resources: the scope to link human and veterinary programmes. *Ac a T: ica*, 76: 3-7.
- Shekara P. (ed.) (2001) P.∜ a e E e i : I dia E e./ie ce . National Institute of Agricultural Extension Management, Hyderabad, India.
- Shepherd A.W. (1998) *Ma*: *e I f* : *a i* SeX ice (*MIS*). *The* : *a d P*:*ac* ice. AGS Bulletin No. 125, FAO, Rome.
- **Shepherd A.W.** (2005) *A cia i f ar e rader*. *Their r*  $\stackrel{!}{=}$  *a d e ia*  $\stackrel{!}{=}$  *f r*  $\stackrel{!}{=}$  *cr her d*  $\stackrel{*}{=}$  *d*  $\stackrel{*}{=}$  *i* Agricultural Management, Marketing and Finance Occasional Paper No. 7, FAO, Rome.

- **Shepherd A.W.** (2007) *A i* ache *i i g i e cei a i e . A ie f e eii ce da e*. Agricultural Management, Marketing and Finance Occasional Paper No. 13, FAO, Rome.
- Sher ood R.M. (1997) Intellectual Property Rights in the Western Hemisphere. *I* e.:-A e.:ica La R\ ie , 28: 566-595.
- Sidahmed A.E. (1998) *Re-cig De i*Le*N ad : I*Le *P -di a e: Rehabili a i .* Staff Working Paper No. 27. IFAD, Rome.
- **Skee J.R. and Enkh-Amgalan A.** (2002) *E a i i g he Fea ibi*  $f \not t = c \quad I \neq a \quad ce i$  $M \quad g \quad ia.$  Policy Research Working Paper No. 2886. World Bank, Washington, DC.
- Sko fia E. (2003) Economic Crises and Natural Disasters: Coping Strategies and Policy Implications. W . d D ∉ e' e , 31(7): 1087-1102.
- Smi h S. (1992) Taxation and the Environment: A Survey. Fi cal St. die , 13(4): 21-57.
- **Smi h L.D.** (2001) Ref  $\tau$  a d Dece  $\tau a_i$  i a i f Agriet  $h_{i} \tau a_i$  SeX ice : A P  $h_{i}$  c Fra e  $\tau$  . FAO Agricultural Policy and Economic Development Series No. 7, FAO, Rome.
- **Sommer F.** (1998)  $Pa = a_i^{\dagger} i$ ,  $d \in gh$ ,  $ea_i^{\dagger} = a_i^{\dagger} i g = d \in e$ . Paper submitted at the FAO electronic conference Livestock Coping with Drought.
- S ad G-J. and Ko riba A. (2004) Agrie. Acrial Scie ce a d Tech | g | dica r, Country Brief No. 17, July, 2004. IFPRI and IER, Washington, DC, and Bamako.
- **S a in R.N.** (1998) *Ma:*  $e -Ba \ ed \ E \ i: e \ a' \ P \ icie$ . Discussion Paper 98-26. Resources for the Future, Washington, DC.
- **S einfeld H.** (1997)  $L_{i}^{k}$  e c  $E_{i}^{k}$  i: e I e:ac i i I eL :ia P: eL c i S e . Proceedings of the International Conference on Livestock and the Environment, 16-20 June 1997, Wageningen, Netherlands.
- S einfeld H., Gerber P., Wa enaar T., Ca el V., Ro ale M. and de Haan C. (2006)  $\mathcal{L}_{h}^{i}$  e  $c' \mid g$  had  $. E \mid i:$  e  $a \mid i \mid e a d i$  . FAO, Rome.
- **S ern N.** (1991) Public Policy and the Economics of Development. *L* : ea Ec ic Re ie , 35(2-3): 241-271.
- **S igli**  $\downarrow$  **J.E.** (1989) The ec ic  $r \mid e$  f he S a e. Basil Blackwell, Oxford, UK.
- **S ringfello R., Co I er J., L ce T., McKone C. and H ain A.** (1997) Improving the access of smallholders to agricultural services in sub-Saharan Africa: farmer cooperation and the role of the donor community. *ODI Na***L**  $a_0^{\dagger}$  *Re* **N** ce *Pe*:  $ec \not i e$ , 6.
- **S** an o S., Leimona B., Pemana R.P. and Chandler F.J.C. (2005)  $R \notin ie f D \notin e' e E \notin i: e a' Se \notin ice i I d e ia.$  ICRAF (World Agroforestry Centre), Bogor, Indonesia.
- **Ta lor-Po ell E.** (1987) *F dde: Ba Te i g a g*  $\mathbf{f}_{c}$  *| a i Ag: a ;a| i i Ce ;a| Nige:ia: Feedi g Deci i i he U e f I ;*  $\mathbf{A}$  *ed F ;age*. Paper 24b. Overseas Development Institute (ODI), London.
- **Theba d B., Grell H. and Miehe S.** (1995) Rec  $g \ i \ g \ he effec \ e \ f \ adi \ i \ a' \ a \ a''$  $a \ c \ c \ c \ e \ f \ a \ c \ c'' \ e \ ga \ i \ g \ e \ e'i \ e \ i \ N \ c' \ he' \ Se \ ega'.$  Drylands Issue Paper E55, IIED (International Institute for Environment and Development), London.
- **Thom on G.R., Le land T.J. and Donald on A.I.** (2009) De-Boned Beef: An Example of a Commodity for which Specific Standards could be Developed to Ensure an Appropriate Level of Protection for International Trade. *Tra b***N**. *da: a d E ergi g Di ea e* , 56: 9-17.

**To Imin C.** (1995) Tracking through drought: options for de-stocking and re-stocking. *I*  $\not \square_{i}$  *i g i h U ce: ai* : *Ne Direc i i Pa*  $\neg a' D \not \square_{i} e' e i Africa, Scoones I. (ed.), Interme$ diate Technology Publications, London.

- Wi con in Depar men of Agric I re, Trade, and Con mer Pro ec ion (2007)  $A \lor a'$  Re : - b e c Facili Si i g. Department of Agriculture, Trade, and Consumer Protection, Division of Agricultural Resource Management, Land and Water Resource Bureau, Resource Planning Section, Madison, Wisconsin, USA.
- World Bank (1999) C e i<sup>®</sup> e Re earch Gra Pr gra . Fi a ci g Agrie hu ra Re earch i hi W d Ba L a . Agricultural Technology Notes No. 24. World Bank, Washington, DC.
- **World Bank** (2001)  $W \not| d D d e' e Re r A ac i g P er World Bank, Washington, DC.$
- **World Bank** (2003) *La*  $d \mid icie f : g: h a d \land e: real c i$ . World Bank Policy Research Report. World Bank, Washington, DC. and Oxford University Press, Oxford, UK.
- World Bank (2005a) *MN I de -Ba ed L* e c *I* k *:a ce P: ec*. Project Information Document (PID) Concept Stage. World Bank, Washington, DC.
- **World Bank** (2005b)  $\mathbf{R}_{i}$ ;  $\mathbf{a}'_{i}$  *Fi* a ce  $I \rightarrow ai$  . *T* ic a d Ca e Su die . Report No. 32726-GLB. World Bank, Washington, DC.
- World Bank (2005c)  $Agrid | \mathbf{w}_{ia} | \mathbf$
- **World Bank** (2005d) *Ma agi g he b* i *e c R* i *P* i *ic a d Tech* j *g Add* r *he Nega* i *e I ac f a Fa -G* r *i g Sec r*. Report No. 32735-GBL. World Bank, Washington, DC.
- World Bank (2006)  $P_i = f R b_i' c S e di g Ref f Uga da' Vin a' <math>P = R d$ . PREM Notes No. 108, World Bank, Washington, DC.
- **World Bank** (2008a) W d d D = e' e Re + 2008: Agrie <math>u = f + D = e' e. World Bank, Washington, DC.
- **World Bank** (2008b)  $L_{h}^{k} e \in E e$ ;  $a_{i}^{l}i e : \mathbb{R} b_{i}^{l}i c P_{i}^{l}i c a d I \neq e Need$ . Report No. 44010-GLB, World Bank, Washington, DC.
- **World Bank** (2008c)  $P_i$  ec A raia D e T  $P_i$  ed La i he A e fUS\$120.0 i||i he Pe  $|e' Re b ic f Chi a f r a Ec -Far i g P_r ec$ . Sustainable Development Department, World Bank, Washington, DC.
- World Bank (2009) / de -ba ed b ∈ c / N /a ce Pr ec . Re r N .AB4518. World Bank, Washington, DC.
- **Wo ink A.** (2003) *The D ch N rie N a e : a e erie ce a d e f r he N re*. Paper presented at the OECD workshop on The *E* Evaluation of Tradeable Permit Regimes. 21-22 January, Paris.
- **WRI** (2005) *W*  $d Re \leftarrow ce 2005$ : The Weal h f he P r. Ma agi g Ec e Figh  $P \checkmark er$ . World Resources Institute (WRI), Washington, DC.
- **WTO** (2004) *W d Trade Re r 2004*. WTO, Geneva.
- Yan Z., Richard C. and Wa er -Ba er A. (2008) C a age e fit a ge a d a id he is aged f he c : e eite ce fit high a d A ia. Paper presented at the XXI International Grasslands Congress/VIII International Rangeland Congress, Hohhot, Inner Mongolia, China.
- Zhao H. (2004) Disease-free export zones key to animal husbandry. Chi a Dai, 28 July.

The livestock sector contributes to the livelihoods of an estimated 70 percent of the world's rural poor. The increasing demand for animal protein in low and middle income countries provides an opportunity for the poor to improve their livelihoods. However, the nature of livestock farming is determined by policy and institutional frameworks that rarely favour the poor.

Launched in 2001 by the Food and Agriculture Organization of the United Nations, the Pro-Poor Livestock Policy Initiative (PPLPI) facilitates and supports the formulation and implementation of livestock-related policies and institutional changes that have a positive impact on the world's poor. To achieve this, PPLPI combines stakeholder engagement with research and analysis, information dissemination and capacity strengthening.

Livestock Sector Policies and Programmes in Developing Countries – A Menu for *Practitioners* comprises a user-friendly, non technical compilation of livestock sector policies/programmes, including case studies, to assist policy makers and development practitioners in formulating and implementing plans for institutional reforms and livestock sector-related policies that will benefit livestock farmers in particular and, in general, all stakeholders along the value chain.



