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**Understanding the Socioeconomic
Significance of Livestock Disease**
with Particular Reference to Surra (Trypanosomiasis),
in Selected Communities in Eastern Indonesia

*Asia Research Centre
Murdoch University*

Australian Centre for International Agricultural Research

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Asia Research Centre
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1 Executive Summary

Preamble

This report was written by Dr Greg Acciaioli, with extensive input from Dr Simon Reid. Dr Acciaioli, an anthropologist, conducted the fieldwork research and Dr Reid's contribution was, among other things, to ensure that the veterinary information (inferred from the material gathered by Dr Acciaioli) could be presented and discussed. The likely causative agents of disease 'syndromes' identified by farmers could be determined in only a few cases (e.g. sarcoptic mange and surra), inferred from the description of fairly characteristic clinical signs. This information may be used as the basis for further studies that would provide more detailed information not only on diseases of livestock, but more importantly on their socioeconomic impact. It is our intention to publish appropriate aspects of this work in peer-reviewed journals in both the social sciences and veterinary fields. These articles will be forwarded to ACIAR upon publication.

Purpose of project

This project was designed to provide preliminary information about the cultural, social, political and economic context of livestock disease in Indonesia and to determine the likely effect on the transfer to Indonesian institutions of diagnostic technologies and control techniques proposed in the ACIAR project AS1/2000/009 'Development of diagnostic and control methodologies for animal trypanosomiasis (surra) in Papua New Guinea, Indonesia, and the Philippines'. Such knowledge is important because the successful transfer of new technology to Indonesian veterinary scientists and extension staff will be of little value if extension staff do not have the opportunity to apply such knowledge in interactions with livestock farmers, and if these livestock farmers do not report outbreaks of disease or are culturally unwilling or financially unable to make use of treatments to control disease.

Aims of project

1. Determine the social context where livestock disease occurs, including:
2. the social and economic impact of the livestock diseases, including surra, on local communities

3. farmer understandings, perceptions of and behaviour towards livestock diseases, including surra, as well as farmer risk assessment strategies and decision criteria regarding treatment, sale or slaughter of diseased animals
4. likely cultural impediments to the transfer of technologies under development
5. Analyse the institutional problems facing livestock agencies as a result of the implementation of regional autonomy, with their effects upon performance of extension agents and upon modes of interaction between providers of extension and of other services and livestock farmers.
6. Assess possible institutional and socioeconomic obstacles to sustainable use of new technologies.
7. Identify measures to improve adoption levels for the technologies and the chance of success for the research.

Background

This project was developed in response to the need to understand the cultural, social, political and economic context of communities in Indonesia and The Philippines where surra occurs. Veterinary aspects of these diseases have been under investigation since 2000 within the scope of the ACIAR project AS1/2000/009, awarded to Dr Simon Reid of the Division of Veterinary and Biomedical Sciences, Murdoch University, who has been working with collaborators, including:

- in Indonesia: Balitvet [*Balai Penelitian Veteriner* or Centre for Veterinary Research]; BPPH VII Maros [*Balai Penyidikan Penyakit Hewan* or Livestock Disease Investigation Centre]; and the Livestock Agency in Jayapura, Papua [Irian Jaya].
- in The Philippines: University of Southern Mindanao; and Department of Agriculture, Southern Mindanao, Region XI.
- in Papua New Guinea: National Agriculture and Quarantine Inspection Service.

This project has focused on improvement of surveillance of surra and of the sensitivity and specificity of diagnosis, especially using molecular

techniques, as well as identifying genetic markers for pathogenicity in *Trypanosoma evansi* and evaluating the existing trypanocidal drugs for treatment of surra.

Development and transfer of these techniques to Indonesian and Philippine veterinary scientists and extension staff will be to no avail if farmers who own and use susceptible livestock in the region do not report outbreaks of symptoms that may indicate the disease, and turn out to be culturally unwilling or financially unable to make use of the trypanocidal drugs whose efficacy has been demonstrated by the research. Ensuring the application of this research requires an understanding of the cultural, social, political and economic context of livestock disease in the region.

The proposal aimed to gather information that would enable an understanding of farmer perceptions of livestock disease, as well as practices of treatment, selling, and slaughter associated with cases of illness, in order to assess the place of surra within the spectrum of livestock diseases that farmers recognise. Knowing whether farmers recognise surra as a distinct disease and whether they recognise it as the same disease across different types of large livestock—horses, cattle and water buffalo—despite the divergence of clinical signs seen in these animals, is crucial to the design of extension efforts to educate livestock owners and minders about surra. Secondly, the ways in which government livestock services have been affected by the regional autonomy reforms also require investigation, since the use of transferred technology and dissemination of information to end users depends upon the channels of government services structured by the hierarchy of agricultural agencies. Thirdly, understanding the interface between these two aspects—the ways in which extension agents and other government officers interact with farmers—is crucial as well. Farmer participation is critical to the successful transmission of knowledge between farmers and agricultural extension service agents, as well as the adoption and dissemination of new techniques and remedies by the former.

To achieve this, personal interview techniques were used to gather information on the:

- attitudes of farmers to surra and their assessment of its severity as a problem with respect to other livestock diseases

- the basis of farmers' decisions to treat by traditional means, invoke the assistance of government officials or private entrepreneurs to treat by modern means (e.g. drugs), sell or slaughter livestock suffering illnesses
- wider social and economic effects of the prevalence of surra on local communities
- institutional and economic obstacles to adoption of new forms of diagnosis, control, and treatment of livestock diseases such as surra
- incompatibilities between farmers' and officials' cultural understandings and modes of interaction when encountering livestock disease
- differences across communities in these factors, as affected both by local factors and national tendencies, including the reforms introduced by regional autonomy

Given limitations of time and finance, the current proposal restricted the research design to investigation of two communities in Sulawesi within the geographic area of responsibility of BPPH VII in Maros.

Description of the work

The overseas component of this project was completed in one survey of 5 weeks duration. The first week was spent at the Research Institute for Veterinary Science (Balitvet), participating in a workshop on diagnostic techniques for *Trypanosoma evansi* infection conducted as part of AS1/2000/009. Two sites in Sulawesi were then chosen to provide a contrast between a well 'developed' region, Maros regency in South Sulawesi, and a more remote and less 'developed' region, the highland Lindu plain in Donggala regency, Central Sulawesi. After initial interviews with officials dealing with livestock production and animal health within departments of agriculture in the two regencies, interviews with focus groups of livestock-owning farmers were organised. After these focus group interviews, specific key individuals were interviewed at greater length, as were other farmers who had recently experienced livestock diseases, especially surra. These were followed by interviews with field extension agents, eight in Maros and one in Lindu (i.e. the only one who has worked there during the past decade). Interviews with farmers were conducted in a combination of the local language, Bugis in Maros

and Tado in Lindu, and Indonesian, whereas interviews with government officials were conducted almost exclusively in Indonesian.

A two-page checklist of topics based on the original proposal was used as a guide in all open-ended interviews with livestock-owning farmers, allowing the informants to expand on those topics they felt most important. Leading questions were avoided; no specific reference was made to surra until late in the interview process. These rapid appraisal techniques were employed rather than a case-study methodology (except in one instance) because of time constraints. They allowed the gathering of more extensive data in a limited time frame, but with inevitably reduced reliability and validity.

Results, conclusions and recommendations

The social context of livestock disease

The two charts Appendix 1 and Appendix 2, display in graphic form the way livestock-owning farmers classified diseases in the two locations. Farmers in both regencies identified clinical diseases characteristic of respiratory tract infection, superficial wounds, skin diseases (e.g. mange) and internal and external parasitism. In fact, infestation by various types of worms was the most commonly identified condition. Surra was recognised as the most feared condition for horses in both locations. The withdrawal of Naganol (the only treatment used in Indonesia) has resulted in an increased number of cases and the necessity to sell or slaughter sick animals. Clinical disease with characteristic features of surra (Losos, 1980) were also recognised in water buffalo but not in cattle in both regions. Although the disease was conceptualised differently in each region the clinical signs were the same, i.e. progressive neurological disease characterised by aimless circling and progressive hind limb weakness and eventual paralysis.

The most evident shared underlying characteristic is the tendency to label cases of illness by a salient symptom rather than by an aetiological factor. Since common disease syndromes differed depending on the species, there was no recognition that different types of animals showing different symptoms might be suffering from the same condition. Nor did farmers in the two groups always use the same symptom to label what would be considered the same disease in scientific terminology.

Local treatment is oriented to eradication or mitigation of symptoms rather than removal of aetiological factors, for example, introducing irritating substances into an animal's nostrils to facilitate expulsion of thickened mucus, rather than medicines to eliminate the causative agents such as bacterial infections. Facilitating a transition to understandings based on aetiological agents rather than salient symptoms might foster greater understanding of not only the basis of many modern treatments, but also of how certain indigenously recognised conditions might best be avoided. Farmers declared a preference for modern medicines to treat animals, but often resorted to local treatments due to high cost or unavailability of these modern medicines.

An important finding was the unanimous assertion by farmers that animals considered too sick to recover were sold or slaughtered locally. Estimates provided by farmers indicated that the value of animals sold for slaughter (all species) was around 50% of the value of a healthy individual. Animals suffering from skin conditions that had progressed to a stage considered no longer treatable were often simply allowed to die, since the meat of such beasts would not be eaten. This is a significant economic cost given that a number of disease syndromes identified by farmers could probably be cured effectively with relatively low cost treatments. It is important to note that this practice of 'salvage' slaughter also occurs in the Philippines where the scale of losses is similar (Reid, 2002). In general the diseases that lead to these losses are preventable or at least curable.

Impact of institutional reform as part of regional autonomy

The regional autonomy reforms in Indonesia have contributed to a decline in the use of modern treatments for livestock diseases. Although now allowed to keep a larger share of revenue from production and resource exploitation, regencies must fund services previously paid for by the central government. Lack of funds in regencies that do not have significant sources of revenue has meant a reduction of services, amalgamation of administrative departments, and closing of some facilities. Animal health posts, formerly a major source of medicines, are mostly inoperative in both regencies investigated. There are no longer any extension agents dedicated exclusively to animal health and production. Instead, agricultural extension agents must now function in 'multi-

skilled' or polyvalent fashion, providing extension in a range of sectors that previously were handled by specialist extension agents, including wet rice and other food crops, estate and garden crops, fisheries, forestry products, and livestock. More specialised training of extension agents is required to provide the knowledge base required to effectively deliver 'polyvalent' services.

Many of these extension agents have no secure wages, but subsist on honoraria from specific projects or have turned to private entrepreneurial activities (e.g. selling livestock), although such activities may still be 'coordinated' by government offices. In fact projects, particularly those financed by foreign sources such as foreign aid agencies and the World Bank, have been the primary means of supporting participatory extension, providing farmers the opportunity to propose topics for extension and other services. Such projects operate only in selected regencies in certain provinces and are a major differentiator of the extent to which reforms in service provision, including extension, have been implemented.

Recommendations

A number of recommendations can be offered based on these findings:

7. Future programs involving extension must focus on the delivery of information related to the identification and control of disease 'syndromes' based not just on identifying clinical signs but also on explaining the role of aetiological agents.
8. Control programs for multifactorial diseases should focus on a structured approach to identifying appropriate treatments for each likely aetiological agent given the clinical syndrome.
9. The slaughter of livestock suffering potentially curable disease is a significant unquantified economic loss for small holder farmers; extension should focus on low-cost treatments and education for farmers on their use.
10. Specific projects with well defined criteria and significant financial benefits for participants are currently the most effective way to reform extension and other services in the direction of greater service provision and farmer participation.
11. Further training of extensions agents is required to equip them with the skills necessary to provide a broad base of information to farmers across the disciplines encompassed by their service.
12. Such projects need to be piloted in regencies that are remote from major administrative centres and have less funds for routine administration at the regency level.
13. Future research conducted by teams combining veterinary and social science expertise is needed to identify other factors contributing to disease transmission across regencies and provinces (e.g. from Southeast Sulawesi to Papua/Irian Jaya), the circumstances in which epidemics of surra and other diseases tend to arise, and to promote implementation of more effective control measures.

2 Glossary

Throughout this report Indonesian terms are given in *italics*, while Bugis terms are given in **bold** and terms in Tado are given in ***bold italics***.

2.1 Abbreviations and Acronyms

APP	<i>Akademi Penyuluhan Pertanian</i> or Agricultural Extension Academy
Balitvet	<i>Balai Penelitian Veteriner</i> or Centre for Veterinary Research]
BIMAS	<i>Bimbingan Massal</i> or Mass Guidance (the first major rice-intensification program of the New Order, lasting into the mid-eighties)
BIPP	<i>Balai Informasi Penyuluhan Pertanian</i> or [the regency-level] Bureau for Agricultural Extension Information [the older term, still in use in Donggala regency]
BPP	<i>Balai Penyuluhan Pertanian</i> or [the sub-district-level] Bureau for Agricultural Extension)
BPPH	<i>Balai Penyidikan Penyakit Hewan</i> or Livestock Disease Investigation Centre, often abbreviated DIC in English
BPPV	<i>Balai Penyidikan dan Pengujian Veteriner</i> or Veterinary Investigation and Testing Centre, the new official term for BPPH
BPTP	<i>Balai Pengkajian dan Penelitian Pertanian Tanaman Pangan</i> or Bureau of Agricultural Investigation and Research into Food Crops
DAFE	Department of Agriculture and Forestry Extension
DAFEP	Decentralized Agricultural and Forestry Extension Project (funded by World Bank)
DFID	Department for International Development (United Kingdom)
DINAMIS	[the Indonesian form of the English term ‘dynamic’] <i>Desentralisasi Inovasi dan Aksi untuk Meningkatkan Servis</i> or Decentralisation of Innovations and Actions to Increase the Level of Service
DPRD	<i>Dewan Perwakilan Rakyat Daerah</i> or Regional Parliament (may be used for provincial or regency level, with Roman numeral after <i>Daerah</i> as differentiator of level)

FET	Farmer Extension Team, an organisation introduced at sub-district level by DAFEP
KCDP	<i>Kantor Cabang Dinas Pertanian</i> or [sub-district-level] Branch Office of the Department of Agriculture
KIPP	<i>Kantor Informasi Penyuluhan Pertanian</i> or Office for Agricultural Extension Information [the newer term, introduced in Maros as part of the administrative reorganisation at the regency level under regional autonomy]
krismon	<i>Krisis Moneter</i> or Monetary Crisis, used as Indonesian term for the Indonesian variant of the Southeast Asian economic crisis beginning in 1997, which in Indonesia led at one point to an 80% drop in currency value of the rupiah (Rp.)
KTNA	<i>Kontak Tani Nelayan Andalan</i> or Mainstay [i.e. ‘Reliable’] Farmers and Fishers
KUD	<i>Koperasi Unit Desa</i> or Village Cooperative Unit, established in BIMAS to channel inputs and market rice harvests
Otoda	<i>Otonomi Daerah</i> or Regional Autonomy
PKMT	<i>Pemukiman Kembali Masyarakat Terasing</i> or Resettlement of the Most Isolated Societies program
Poskeswan	<i>Pusat Kesehatan Hewan</i> or Animal Health Posts
PPL	<i>Penyuluh Pertanian Lapangan</i> or field agricultural extension agent(s)
PRA	Participatory Rural Appraisal
Satminkal	<i>Satuan Administrasi Pangkal</i> or the unit[y] of administration at base
SPMA	<i>Sekolah Pertanian Menengah Atas</i> or Agricultural High School
UPKG	<i>Unit Pengelola Kelompok Gabungan</i> or The Controllers’ Unit for United [Farmers’] Groups
WKPR	<i>Wilayah Kerja Penyuluh Pertanian</i> or [clearly delimited] working area for agricultural extension agent

2.2 Indonesian Terms

<i>adat</i>	local custom, seen as the basis of rural legal and ceremonial order
<i>bengkak</i>	swollen, [o]edematose
<i>berkeliling-keliling</i>	circle around and around

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<i>berputar-putar</i>	circle aimlessly	<i>ladang</i>	dry fields, used for planting dry rice, usually intercropped with various tubers and other vegetables
<i>bersela</i>	brucellosis	<i>Lebaran Haji</i>	Islamic holiday celebrating achievement of pilgrims to Mecca, an occasion for distribution of meat to poor fellow Muslims
<i>bersin</i>	sneeze	<i>lepra</i>	leprosy
<i>betina</i>	female [of animals]	<i>lontar</i>	palmyra palm
<i>binti-binti</i>	the small spots or bumps (pustules?) that are the first symptom of puru Jawa	<i>lumpuh</i>	lame, paralysed
<i>bupati</i>	head of regency or <i>kabupaten</i>	<i>magang</i>	apprentice
<i>cacingan</i>	infestation by worms (<i>cacing</i>)	<i>mantri hewan</i>	veterinary aide, as labelled in Central Sulawesi; also called <i>paramedis hewan</i> in South Sulawesi
<i>camat</i>	head of a sub-district (<i>kecamatan</i>)	<i>menceret</i>	diarrhoea (root <i>ceret</i>)
<i>bupati</i>	head of a regency (<i>kabupaten</i>)	<i>menjalar</i>	to spread (of a disease, roots of a plant, etc.) (root <i>jalar</i>)
<i>dedak</i>	mixture of rice and bran that is a by-product of rice-milling (and often sold at mills at very cheap rates as livestock fodder)	<i>menyembir</i>	to spit or spray
<i>denda</i>	fine(s)	<i>musim hujan</i>	rainy season
<i>desa Dinas</i>	municipal village	<i>musim</i>	
<i>Pertanian</i>	Agriculture Department or Agency (at the regency level)	<i>kemarau</i>	dry season
<i>empang</i>	brackish pond constructed to raise shrimp and fish	<i>obat</i>	generic term for medicine of any type
<i>gabah</i>	harvested rice separated from the stalks but still unhulled	<i>pancaroba</i>	transition period between the east and west monsoon seasons
<i>gaji</i>	salary	<i>paramedis</i>	
<i>gomok</i>	engine grease	<i>hewan</i>	veterinary aide, as labelled in South Sulawesi also called; <i>mantri hewan</i> in Central Sulawesi
<i>gubernur</i>	governor or head of province (<i>propinsi</i>)	<i>pedas</i>	hot, spicy (i.e. full of chilli)
<i>haji</i>	title for person who has made the pilgrimage to Mecca	<i>pegawai</i>	national employee/official, paid on <i>negeri</i> national salary scale
<i>honor</i>	honorarium	<i>petani</i>	livestock-owning farmers
<i>ingus</i>	mucus	<i>peternak</i>	
<i>jambu biji</i>	guava	<i>petani pemandu</i>	'guiding farmers', farmers with whom PPL work directly and who pass on extension information to other ordinary farmers
<i>jantan</i>	male [of animals]	<i>pinang</i>	areca nut, an ingredient in several local remedies (also often mixed with betel and other ingredients (gambier, tobacco, etc.) to form a quid for humans to chew)
<i>kabupaten</i>	regency or district, the administrative division between a province and a sub-district, headed by the <i>bupati</i>	<i>pisang batu</i>	type of banana containing seeds
<i>kayu lita</i>	type of rubber tree whose bark is used in a deworming remedy	<i>plu</i>	flu
<i>kecamatan</i>	sub-district, the administrative division between a regency and a municipal village, headed by the <i>camat</i>	<i>polivalen</i>	polyvalent, multi-skilled
<i>keguguran</i>	experiencing a miscarriage, from the root 'gugur', to fall out [prematurely]	<i>propinsi</i>	province
<i>kelompok tani</i>	farmer groups	<i>rica Jawa</i>	Javanese 'long' peppers
<i>kempes</i>	deflated, like a leaking tire	<i>sapi</i>	cow, cattle
<i>kena</i>	to be struck (e.g. by illness)	<i>sawah</i>	wet-rice fields
<i>keong</i>	snail(s), including those serving as intermediate hosts for schistosomes	<i>sesak nafas</i>	irregular, short-winded breathing
<i>kuda</i>	horse	<i>Subdinas</i>	Animal Husbandry Subunit (before regional autonomy reforms, this was a department or agency (<i>dinas</i>) on its own)
<i>kuku</i>	hoof, nail	<i>Peternakan</i>	
<i>kuman</i>	germ(s)		
<i>kerbau</i>	water buffalo		

2.3 Bugis Terms

annyarang	horse	japi	cow, cattle
balong	infected cuts, occurring on the legs of a horse	jara	horse
bitokeng	infestation by worms	katabo	lice infestation of horses
bolokeng	flu, as suffered by both humans and livestock	katotoka	same as <i>natotoka</i> , experiencing sores around the eyes
boro	swollen, [o]edematose	lamba	type of tobacco
boro-boro	the small spots or bumps (pustules?) that are the first symptom of puru Jawa	lengaru	type of tree whose bark is used in remedies to treat worms
bulalakeng	an eye disease in horses, progressing from excessive tears to blindness	nabakumo	thickening of mucus and clogging of nostrils
cakiki	lit. '[the belly] rises', the name given to surra among horses	nabalentunga	infestation by small worms of reddish colour
cora'	skin condition afflicting cattle (probably mange)	naganggalaa	infestation by small, short worms
joli	diarrhoea	nagila	mad, insane
koro	thin; makoro 'to become thin', an alternative designation of surra for horses	nagola mata	eye condition causing excessive tears (for horses)
lasa	disease, illness. malasa : to be ill	nakali	eye infection among buffalo
locco'	brucellosis (lit. 'having a miscarriage')	nakalindoroa	infestation by worms generally; at lower level of contrast infestation by particular type of large worms
téba' lica-lica	type of rubber tree whose bark is used in a deworming remedy	nakatonea	having type of sore on legs
lontara'	palmyra palm (various species of <i>Borassus</i>), used for medicaments and for providing a type of paper for indigenous manuscripts	nakompe	'deflating [of the stomach]', definitive symptom for surra in horses
lumpu	paralysed, lame	nalosu	leaky, punctured, used to describe cuts on horse legs
lumpu-lumpu	kind of paralysis, Bugis term for surra among buffalo	nangepe	lame
mangoro'	emit rattling sound from throat, snore, alternative Bugis label for SE (septicaemia epizootica)	nanguwa	experiencing excessive mucus formation
pappiara	literally, 'those who keep care of', (owners and minders of livestock)	naombo	retraction of eyes into the face, the major symptom of <i>nakalindoroa</i>
perru	sneeze	natotoka	experiencing sores around the eyes
puru Jawa	a skin disease among horses	nolili	to circle aimlessly (<i>berputar-putar</i>), the most salient symptom used to label surra among buffalo at Lindu
sanro	healer, officiant at consecrations [i.e. of houses, boats, babies, livestock, etc.]	nolupu	become lame
sapi	cow, cattle [the same term as in Indonesian]	noparuja	use large numbers of buffalo to trample the soil of a field before transplantation of rice seedlings
tédong	water buffalo	noteda	lame
tojo	fatigued	oli	brideprice
ujangeng	mad, insane	tana viata	sacred land upon which no encroachment is allowed; violation results in calamities visited upon the trespassers by guardian spirits (<i>viata</i>)

2.4 Tado terms

bantilala	type of grass
bengka	[water] buffalo
giwu	finer, paid as part of the traditional adjudication process forming the foundation of local <i>adat</i>

3 Research Methodology

The first week of the research period was spent at Balitvet in Bogor attending the training workshop on survey methodology and diagnostic techniques conducted as part of AS1/2000/009 and attended by representatives from Indonesia, the Philippines and Papua New Guinea. This workshop provided the chief investigator with information about surra and epidemiological principles employed in the current study of surra. It also allowed consultations with attending veterinary scientists from the BPPH in Maros to plan the field research in Sulawesi.

Two study sites were chosen. The first area was covered by the sub-districts immediately surrounding the BPPH Maros, and the second was the highland area of Lindu in Palu Central Sulawesi (see Map 5), where due to the absence of any roads for motor vehicles, horses are used to transport produce and other goods, and water buffalo rather than tractors are used to work the wet-rice fields. The selection of these two sites enabled a comparison of two quite different farming areas and of wide differences between the conditions and perceptions of farmers in lowland and highland wet-rice areas. It also illustrated the vast differences in availability of knowledge and medicines and in advancement of administrative reorganisation under regional autonomy between the two regions.

Maros is an example of a progressive regency, located in the immediate hinterland of a provincial capital, its capital a town of over 250,000 inhabitants. Maros has its own BPPH, which serves as a centre for livestock disease investigation for the entire northern stretch of eastern Indonesia, encompassing all of Sulawesi, Maluku and Papua (Irian Jaya). Maros has been a showcase regency hosting many development projects (e.g. tractorisation for wet-rice fields, commercial shrimp and fish ponds, etc.). Donggala regency has no direct road access to its capital (a horse trail leads up from the main road between Palu and Kulawi to the Lindu plain) and administrative reform under regional autonomy has barely begun. Whereas Maros has been a showcase regency hosting many development projects, Donggala, like Central Sulawesi as a whole, has remained a relatively neglected area of development.

After initial interviews with officials in the relevant subdepartments (e.g. Animal Husbandry, Animal Health, etc.) of the regency level Department of Agriculture, interviews with focus groups of livestock-owning farmers were organised in two different sub-districts. One such interview in Maros involved 10 representatives of cattle-owning farmers and 10 representatives of horse-owning farmers; a second focus group interview was conducted with over 20 water buffalo-owning farmers. After these focus group interviews, specific individuals were then interviewed at greater length based on their contributions to the focus groups. However, such follow-up proved difficult both due to transport problems and the seasonal labour schedule of farmers who were in the middle of transplanting seedlings for the second rice crop of the year. Although one leader of a farmer's group was interviewed, interviews with individuals were largely conducted with farmers living in houses spread among the rice fields in the immediate hinterland of the BPPH. At Lindu only one focus group interview was conducted with eight individuals, combining farmers owning the largest number of water buffalo and horses in the village with follow-up interviews with two farmers the next day.¹ At both sites, interviews were sought with extension agents. In Maros a group interview was conducted with eight extension agents who were attending a seminar at the Office for Agricultural Extension Information. Only one extension agent has worked at Lindu for the last decade; he consented to an extended interview.

A two-page checklist of topics drawn from the research proposal was used as a guide in all interviews with livestock-owning farmers. All topics on the checklist were covered, but in different orders with different individuals and when discussing different sections of the checklist (e.g. horse diseases as opposed to water buffalo diseases). This allowed the flow of conversation in these open-ended interviews to influence the ordering of topics discussed. Ideally, this type of study would utilise a case-study approach to follow

¹ Cattle – all of them are Bali cattle – are owned in far fewer numbers in this highland setting.

the course of several animal illnesses over an extended period (Frake 1980) to get a detailed account of the progression of symptoms and the efficacy of attempted remedies. However, time restrictions required rapid appraisal techniques, which allowed the gathering of more extensive data in a limited time frame, but with inevitably reduced reliability and validity. In only one case (a water buffalo in Maros) was a case of surra studied. Nevertheless, the predominant methodology yielded

sufficient results to allow broad characterisation of farmer understandings of livestock disease and considerable understanding of the differential impact of various measures adopted in the two regions under study as part of the implementation of regional autonomy.

4 Farmer Classifications of Livestock Diseases

4.1 Maros Regency

4.1a Setting

Maros regency is located immediately north of the provincial capital Makassar, lying between 40°45' to 50° South latitude and 109°20' to 129°12' East longitude (see Map 3). Its population is approximately 275,000, with an annual growth rate of 1.67% and a population density of 170/km². It currently consists of 12 sub-districts, containing a total of 103 administrative villages. Its local economy is largely oriented to agricultural pursuits, primarily wet-rice agriculture for local supply and cultivation of fish and shrimp in brackish ponds for export. Estate and garden crops rank third as a highlighted economic sector and livestock development ranks below that in priority.

Disease categories were described separately for each of the three types of large livestock—horses, cattle, buffalo.

4.1b Horses

In Maros farmers do not generally maintain horses in large numbers. Many farmers have none whatsoever, while those who do possess them usually have only one or two. Only a few entrepreneurs, who make their living transporting rice and other products to rice mills and other destinations, own large numbers of horses. Unlike other parts of South Sulawesi (e.g. remoter areas of Bosowa²) where horses are a primary means of transport for human beings, horses in Maros tend to be used exclusively as beasts of burden. During the dry season they tend to be allowed to graze in open areas used for pasture and fields not under cultivation, where horses from several owners may be placed together. During the wet season when

they tend to be affected by illnesses they are housed separately in pens and other enclosures.

The first disease category identified by the farmers was upper respiratory tract infection (**bolokeng** or *plu* (i.e. flu)) characterised by the continual emission of mucus from the nostrils, inappetence, pyrexia, mandibular swelling and in severe cases the scrotum may become swollen but it is rare for horses to become paralysed from this condition. This disease is not fatal and tends to respond to treatment quite readily. Most upper respiratory infections occur in the rainy season.

Upper respiratory tract infections are the easiest of the diseases for farmers to treat on their own. The aim of treatment is to induce the horse to expel nasal mucus by immersion of the horse in water, which is said to cause the horse to increase its mucus production. Other methods depend upon introducing irritant substances such as vinegar, coffee and smoke from burning areca leaves into the horse's nostrils, which will cause the horse to sneeze. Once all the mucus was expelled the horse was considered healthy.

If such procedures were not effective, the farmers would seek assistance from external agencies. As in the case of human illnesses, obtaining an injection is considered the most effective treatment. The injection may be either of an antibiotic, commonly oxytetracycline, or of Vitamin B. The latter is considered effective because it tends to increase appetite, which is a common clinical sign.

The second health problem in horses that farmers felt able to treat on their own, was **balong**, which occurs mostly in the dry season because the most common cause of wounds are fights among male horses whilst competing for access to females. Such fights are more likely during the dry season, when horses are most likely to be grazing together rather than kept separate. Although this is not an illness as such, farmer classification included them within the category of 'diseases'.³

Often the first clinical sign noticed by a farmer is self-trauma eventually resulting in secondary infection and the presence of a purulent exudate. As

² Bosowa is a local acronym referring to the three regencies Bone, Soppeng and Wajo'. All three are to the northeast of Maros, in the Bugis heartland of the province (See Map 4) and populated predominantly by Bugis. Wet rice cultivation is the predominant mode of livelihood, both for subsistence and cash sales, although Soppeng tends to be somewhat hillier and thus have a lower proportion of wet-rice compared to dry crop fields.

the infection proceeds it becomes more difficult to treat. Once the infection is said to have entered the hoof, it can no longer be treated and it is accepted the horse will die.

Wounds are usually debrided with a knife or machete (bush knife) then cauterised using a red-hot piece of metal such as a crowbar. A poultice may then be prepared using ash from leaves of the palmyra (*lontar* or *lontara*) palm mixed with onions and coconut oil. This mixture is left on the wound for a number of days.

Once infection is considered to have entered the horse's hoof, the animal is sold either to a trader who specialises in buying horses for slaughter or sometimes to a group of men who purchase the horse for local consumption. Horse meat is considered a delicacy and used in local dishes for special celebrations. Such cases are never brought to the attention of the Department of Agriculture or the Livestock Disease Investigation Centre for alternative treatment because the horse is considered as good as dead once it is judged the infection has entered the hoof.

The economic loss attributable to this practice of slaughter of "incurable" infections is substantial. An average horse in good health is worth approximately 2 million rupiah (approximately AUD\$406)⁴, but if it is known it suffers from **balong** in its hoof, it is worth only about Rp. 500,000 (less than AUD\$102), 25% of its value when healthy. The loss is so great because horses are valued not for their meat but for their ability to transport agricultural produce, which is not possible once its hoof is infected.⁵

The third disease mentioned by farmers as treatable without recourse to external agencies themselves is **bulalakeng**⁶, an eye disease that progresses through several stages and is most common in the wet

³ The Subanun studied by Frake (1980) also make no distinction between what we would distinguish as illnesses and infections in our classification of human ailments.

⁴ Conversion rate: 1 AUD = 4,925 IDR.

⁵ Horses thus tend to be owned only in those villages where fields are at a considerable distance from residences and roads, as was the case in the village in which I interviewed ten horse-owning farmers. Farmers reported other uses for horses, such as ploughing, but none of the horse-owning farmers I interviewed said they themselves used horses in this manner.

⁶ Matthes (1874: 225) glosses *bulalakeng* as 'having a white fleck in the blackness of the eye' [my translation from Dutch].

season. Initially there is a continual watering of the eye(s) followed by the development of presumably corneal oedema (the eye(s) turn from black to white) and finally the horse may become blind if treatment is unsuccessful.

Treatment must be initiated before the eye begins to turn white, and is usually undertaken by the horse owner himself. A mixture of water and any commercial soap or detergent is used to clean and irritate the horse's eye. A horse healer may also be called upon to provide a healing mixture made from traditional ingredients. The aim of the procedures used is to force out the 'eye mucus'. Although the 'eye mucus' must be removed to effect a cure it is not considered the actual cause of the illness, which the farmers are unable to identify. If treatment is not successful the horse is sold for slaughter at about one-quarter of their value when in a healthy state.

The second group of horse diseases were those which farmers felt totally unable to treat on their own. The first disease mentioned was surra or animal trypanosomiasis (caused by *T. evansi* infection). Farmers' classified the disease using two terms, each constituting separate clinical signs. The most common name used was **cakiki** (literally, 'it [the belly] rises'). Alternatively, it was known as **makoro** (becoming thin). Animal Husbandry Subdepartment officials present at the interview identified this disease immediately as surra (Luckins, 1988, Reid, 2002). Horses were equally likely to contract **cakiki** at any time of the year. The farmers interviewed did not know how the disease was transmitted.

The initial symptom is a hardening of the horse's back, moving from the withers to the tail. On one side, the legs begin to go numb and are difficult to bend, a symptom that can spread to the other side as well. The entire body of the horse may also begin shaking at this point. After this, the horse begins to become emaciated, specifically noted as the horse's belly rising into the body. This phase gives the disease its name, since it is the definitive sign; appearance of the previous symptoms do not yet allow certain diagnosis of a case of this illness. At this point a male horse's genitals also may become swollen (i.e. oedema), although no analogous symptoms are noted among female horses.

If the illness has proceeded to the point of evident **cakiki**, then farmers are likely to report the case to

officials of the Animal Husbandry Subdepartment.⁷ Up to the 1980s, farmers were able to obtain treatments of Naganol (the only effective treatment available in Indonesia) for prices below Rp30,000 (~A\$6.00), but in recent years have been unable to procure it regularly. When it has been found, prices of over Rp. 100,000 (~A\$20.00) are asked.⁸ Farmers usually take the decision to sell (once more losing 75% of its value) or slaughter the animal for its meat rather than pay such prices, though they declared a willingness to try alternative drugs if these could be purchased for less than Rp 100,000/dose.

Cakiki was recognised as a disease that had long afflicted horses in the region, going back to the time of their ancestors. However, it was rare in Maros, unlike the situation reported for the core Bugis regencies of Bosowa located to the north. Another farmer hailing from Tanru Tedong, in the northern Sidrap regency, noted that many horses suffered from **cakiki** not only in his home area, but even in a village only three kilometres from the BPPH. Farmers in the focus group suggested that it tended to occur only when animals had been bought in other regions of South Sulawesi and brought to Maros. However, in recent years **cakiki** has been encountered more frequently than when Naganol was readily available.⁹

The last disease mentioned by farmers was **puru Jawa**, a skin disease considered to have been introduced from Java. Puru Jawa affects all types of horses and begins with a series of small spots or bumps on the neck and shoulders of the horse, then spreads across the body. No other clinical signs are evident. Treatment involves either parenteral antibiotics or topical application of antiseptic/antifungal chemicals. However, farmers now have difficulty in obtaining such modern treatments. Maros farmers were unwilling to consume any horse afflicted with a skin disease so horses were usually left to die rather than being sold for slaughter.

⁷ Before regional autonomy reforms this subdepartment was a department (*dinas*) on its own at the regency level, rather than being amalgamated within the agriculture *dinas*. See below in section VI for more detail on administrative changes occurring with regional autonomy.

⁸ Farmers were unaware that Bayer had ceased production of Naganol. Hoarded supplies of the drug were found now and then, but priced at a premium.

⁹ Prophylactic doses of Naganol among Bugis horse owners every three to six months was noted as a common practice by the agricultural extension agent in Lindu, Central Sulawesi, although the livestock-owning farmers interviewed at Maros did not mention this usage.

4.1c Buffalo (*Tédong*)

Water buffalo are commonly used throughout South Sulawesi for animal traction. However, despite the recognition of their strength for agricultural tasks, since 1982 they have been increasingly displaced by tractors, especially in those areas with ready access to fuel and spare parts (e.g. in the immediate hinterland of the regency capital Maros). Longer schooling for young boys, previously the major pool of buffalo minders, has also meant that labour for taking care of buffalo has become increasingly scarce. However, even in those areas where tractors have become common, some farmers still breed buffalo for sale; they are regarded as relatively robust, and large specimens fetch high prices (although the price per kilogram is comparable to that of cattle), with the overall range being 2.5 to 7 million rupiah (AUD \$516 to \$1,446), depending upon size, age, horn size and other markings. Farmers who keep buffalo usually have between two and five. Most farmers prefer raising water buffalo to cattle because they are the most robust of large livestock, suffering far fewer conditions than either horses or cattle. However, the disadvantage of raising buffalo is that they reproduce only once every two to three years—rather than the annual reproductive frequency of cows.¹⁰ Nevertheless, farmers estimated that among livestock owners in the sub-district, 65% raised buffalo while, at most, 35% preferred to tend cattle.¹¹

The most common condition¹² afflicting buffalo is internal parasites (worms), referred to by the same term as for cattle: *bitokeng* or *cacingan*. In fact, farmers claimed that the same worms afflict cattle and buffalo. The focus group of buffalo-owning farmers emphasised that worms tended to be a problem only in younger animals from one month to one year in age. They considered that the ingestion of soil was the source of infection for calves. Once a buffalo reached one year of age it was considered assured capital (*modal*) for its owner, as it was thought to be ‘released from worm infestation’. There was no particular season when *bitokeng* was more prevalent. Clinical signs attributed to worms

¹⁰ In fact, farmers identified improved fertility in buffalo as their most important priority.

¹¹ Contrasting with the first group of farmers interviewed, livestock owners in this village did not keep any horses. Rice fields in this village were immediately in back of their houses and thus directly accessible to the road, allowing

¹² Actually, the most troublesome ‘condition’ in regard to water buffalo was said to be theft. As one farmer put it, ‘thieves should be regarded as a disease too!’

included a rough coat (piloerection) and a refusal of the calf to suck at its mother's teat. Its mouth might begin to smell and it would develop abdominal swelling, inappetence and if not treated its faeces might turn a whitish colour.

Bitokeng was regarded as relatively easily to treat, as long as it was caught early. One remedy involved forcing the calf to eat small leaves from a particular species of shrub (**daung bingkuru** or *daun mangkudu*)¹³ daily for three days. Farmers tended to treat their own buffalo. However, farmers preferred to source anthelmintics from the local 'livestock paramedic'.¹⁴

The second most common buffalo condition was also common to cattle: **cola** or mänge (probably caused by *Sarcoptes* mites). Clinical signs in buffalo and cattle include loss of body hair due to continually scratching itself against tethering posts, trees and other objects. If no treatment is given the buffalo would begin to lose weight. Farmers claimed that the mänge could be avoided by ensuring buffalo had access to mud for wallowing, especially during the dry season. The condition afflicted young and old buffalo equally.

The most common remedy for **cola** was to rub the hide of the buffalo with old motor oil or with 'dirty' water, i.e. a mixture of water that had been discarded after washing or food preparation in the kitchen with local soil. A buffalo would usually recover from this condition after such treatment, but if it did not, farmers were more likely to sell it than to seek modern treatment. However, it would lose 50 to 60% of its value if sold in this condition. Farmers were unaware of the availability of the anthelmintic ivermectin which is a very effective treatment for internal and external parasites providing cure with a single dose. A single dose of ivermectin costs approximately A\$10.80, which compares favourably to losses of up to 4 million rupiah (AUD \$826.00) if clinically affected animals are sold.

The third condition mentioned by the focus group of farmers was simply given by the initials SE, although farmers did not know that SE stands for

septicaemia epizootica. As for cattle, it was also known by the Bugis term **mangoro**, referring to a particular rattling sound made in the throat (Said 1977: 141). SE was identified by BPPH staff as Haemorrhagic Septicaemia, an acutely fatal disease caused by infection with *Pasteurella haemolytica* that occurs in devastating epidemics.

Buffalo-owning farmers in this focus group did not mention any disease that corresponded with surra. However, a case occurred in a buffalo a village approximately one km east of the BPPH that nine days earlier had begun to circle aimlessly around its tether, eventually collapsing to the ground, unable to move (**lumpu**) and weak (**matojo**) due to the paralysis that had begun on its right side. The owner labelled the condition **lumpu-lumpu**, a condition of general paralysis. When queried as to the other diseases to which buffalo in the region were prone, he stated that this was the only affliction he had encountered. It tended to occur in the time of transition between the two monsoons. The animal was treated and after 3 days the buffalo was able to stand again, although BPPH staff warned the owner that such a cessation of symptoms may be temporary.

4.1d Cattle (*Sapi*)

Farmers were much less detailed in their accounts of diseases that affect cattle, often because they were recounting diseases which they had not witnessed themselves. Cattle, although sometimes used for ploughing, are largely kept only for sale and slaughter. Most farmers do not own cattle, but those that do average two or three head. Projects to establish cattle ranching operations in South Sulawesi have generally not been successful (Spencer and Quane, 1999). Live cattle used to be imported into the province, mostly from Java but also, to a lesser extent, directly from Australia, but such imports have stopped since the economic crisis began in 1997 (Spencer and Quane, 1999). Cattle are commonly regarded as less likely to be afflicted by illnesses than horses and they are no longer treated by local means, either being given modern drugs or slaughtered. Such treatment indicates that cattle have been brought more recently from outside (in fact, most cattle in this region are Bali cattle) and have been less integrated into the local economy.

The cattle disease for which the farmers provided the most detail was **bitokeng** or *cacingan*, infestation by worms. However, despite noting the frequency of this condition, they were not able to provide any detail as to various types of worms that

¹³ This leaf was not available in the vicinity and I have been unable to find it in any Indonesian or Bugis dictionary. I must therefore leave it unidentified here.

¹⁴ Farmers in villages further away from the location of a paramedic would have to rely on local remedies to a greater extent.

could be found. Affected cows tended to lose weight despite a good appetite. In advanced cases the coat becomes rough and diarrhoea could occur. If not treated, such a condition could lead to death.

Several local treatments for worm infestations were offered. The simplest was finely pounded areca nut (*pinang*) fed directly to the ill cow. Slightly more difficult was combining yeast (*ragi*) with the mixture of rice and bran (*dedak*) that is a by-product of rice-milling. Another remedy was based on mixing the crushed bark of a particular species of rubber tree (**téba' lica-lica** or *kayu lita*), renowned as particularly bitter, with *dedak*.

Also commonly encountered was the condition **joli** or *menceret*, (simple) diarrhoea. Although diarrhoea was also recognised as a symptom of other diseases, when encountered alone it was treated as a condition by itself. It was usually caused by eating grass or weeds that were too young, and was easily cured by feeding the afflicted cow the rice/bran mixture (*dedak*), or large quantities of particular species of banana known for containing seeds (*pisang batu*), or the leaves of the guava (*jambu biji*) tree. If these local remedies did not work, farmers would seek antibiotics.

Like horses, cattle could also be afflicted by the eye condition **bulalakeng**. However, unlike horses, cattle would more commonly be treated using eye drops readily available for humans. Like buffalo, cattle were also subject to the skin condition called **cola**. Cattle would be treated by bathing the animal in any commercially available detergent dissolved in water; usually bathing the animal three times was sufficient. Other farmers preferred to apply used motor oil to the cow's skin. Such a condition was almost always responsive to such treatments; but if these home remedies did not work, then the farmer could resort to the organophosphate insecticides such as Asuntol. The condition was not transmissible to humans.

Locco or *keguguran*, 'experiencing a miscarriage' (abortion), was the local term used for brucellosis, also recognised by the Indonesian pronunciation of this latter term, '*bersela*'. Using this symptom meant this was a disease only recognised as afflicting female animals. The prematurely born calf was always dead and the mother would become sterile thereafter. There was no way of treating this disease, according to the farmers.

The other recognised diseases were those about which farmers had heard but not witnessed. These were considered major diseases because there were no known treatments. The two readily identified were haemorrhagic septicaemia (HS) and anthrax. HS has practically been eradicated by the vaccination program earlier established by the BPPH. Farmers were aware of the possibility of transmission of anthrax to human beings and the need to kill and completely bury any animal exhibiting these symptoms.

Cattle diseases were classified according to whether they could be treated by any means (traditional or modern) and those that could not be treated at all. Farmers more frequently treat diseases in the former category using modern drugs and chemicals. Diseases in the latter category tended to be those which had been eradicated by vaccination programs and were no longer part of farmers' everyday experience.

4.2 Donggala Regency (Lindu Plain)

4.2a Setting

Donggala regency, located between 0°30' north latitude and 2°20' south latitude and 119°45' and 121°45' east longitude in Central Sulawesi contains 720,500 people, over a third of whom live in the provincial capital Palu, which also serves as the capital of the regency (<http://www.donggala.go.id/>). It has achieved a population growth rate of 2.26 percent over the last 10 years, much of it due to immigration, especially of Bugis and other ethnic groups from South Sulawesi. However, its average population density is only 43/km², distributed quite unevenly across its 16,704 km² area, with the highest density in the municipality Palu and the surrounding wet-rice areas in the Palu Valley immediately to the south and quite sparse densities in the surrounding mountains, which make up most of the regency's area.

The Lindu plain, the location of the second field site, is located in the northeastern section of Kulawi sub-district, forming an enclave within the Lore Lindu National Park (see Map 5), which itself covers 229,000 ha (http://www.walhi.or.id/BERITA/Lembar_fakta_dongi2.htm). The plain is accessible only by a 17-km horse trail from the main road between Palu and Kulawi. The indigenous Lindu people dominate the population of the three administrative villages (*desa*)—Langko, Tomado and Anca—whose hamlets are scattered all around the lake. However, Puroo, at the

southwestern entrance to the plain, is inhabited almost exclusively by resettlers.

A single extended interview was conducted with a focus group of farmers that own each species of livestock rather than with separate focus groups of owners of horses, cattle and buffalo. Follow-up interviews were conducted with two selected individuals from this group, and a couple of other farmers who had been unable to attend the group interview, over the ensuing two days.

4.2b Horses (*Jara*)

Horses are the most important species of livestock in this area because they are the primary means of transporting agricultural products from the Lindu plain to the motor vehicle road leading to Palu and of carrying back to the Lindu plain sundry goods. They provide the major means of linking Lindu to the wider world and are regarded as essential to the economic life of villagers. Local inhabitants, mainly youths, also ride horses for travel between villages within the plain.

The most common ailment identified was worm infestation. The main clinical signs of worm infestation identified by farmers were a sunken eyes often accompanied by a rough coat (piloerection), eventual inappetence and finally weight loss. The source of infection for horses was considered to be mud-covered grass or other fodder upon which horses would feed.

Within the classification of internal parasitic disease were three further levels of characterization based on the size and colour of the worms recovered from the intestines of horses. **Nakalindoroa** resulted from a large species of worms, **Naganggalaa** resulted from smaller, shorter worms that tended to stick to the large intestines and **nabalentunga** resulted from small worms that were somewhat reddish in colour and tended to stick to the heart as well as the intestines. Because all of these worms produced the same symptoms, the only way of telling which type of worms was causing the condition was to inspect the intestines of the beast once it had been slaughtered, as all three types of worms were readily visible to the unaided eye. For treatment only the anthelmintics from the government veterinary aide were known, but these were seldom available because the Palu-based official only visited the Lindu plain one to three times annually.

Although worm infestations were the most common livestock problem encountered, the condition **nakompe** (surra) was considered the most serious condition for horses. During the colonial era, Dutch veterinarians had told them that transmission of the disease was by flies and was so rapid that affected animals had to be shot and disposed of immediately. Horses in the advanced stages of surra are still slaughtered and immediately buried. The initial clinical sign of surra is a nasal discharge that becomes thicker followed by episodes of pyrexia. Subsequently, the abdomen of the horse becomes ever smaller, like sunken cheeks, as if deflated. Lindu farmers recognise the same cardinal signs for surra in horses as the Bugis farmers in South Sulawesi. Other symptoms may occur including irregular, short-winded breathing and eventually paralysis, rendering the horse unable any longer to stand up. In addition the scrotum of male horses become oedematous and the animal may have difficulty urinating. Lindu farmers knew of no indigenous methods of treating a horse showing signs of surra. Farmers were familiar with the drug Naganol, which had occasionally been brought to Lindu by the veterinary aide, but regarded it as useless once the stage of 'stomach deflation' had been reached. Indeed the use of Naganol in advanced stages of surra could worsen clinical signs and hasten death (probably as a result of exacerbation of lesions in the brain in response to the release of large amounts of antigen from dead trypanosomes). Naganol was considered a prophylactic or early-stage medicine¹⁵.

Horses also suffered from hoof and lower leg wounds caused by stone bruises/injuries. These were most often treated using injectable penicillin if it was available.

Lindu farmers also recognised an eye condition whose major symptom was an excessive flow of tears similar to that reported in Maros, although they did not limit this condition specifically to horses. This condition was treated by irrigation of eye with a salt water. This treatment was reported to

¹⁵ In a later interview the PPL confirmed this evaluation that Naganol could only be used for prophylaxis; once a horse began to show symptoms, injecting with Naganol only worsened the symptoms and led to a quicker death. He also noted that 100% of the Bugis horse-owners at Lindu had used Naganol in order to prevent **kompe** when it was still readily available, whereas indigenous Lindu horse owners had only resorted to Naganol once their horses were sick and it was no longer effective.

usually be effective but the infection could result in eventual blindness in some cases.

Lindu farmers also identified lice as a common infestation that affected only horses. Lice were usually successfully eradicated using kerosene sometimes mixed with crushed tobacco leaves (both of which are effective insecticides). Lice infestation could lead to thinner and weakened horses (possibly due to blood loss from sucking lice).

4.2c Buffalo (*Bengka*)

Buffalo are undoubtedly the most important of all large livestock at Lindu, both practically and ceremonially. Their traditional use distinguishes highlanders from lowlanders; indeed, almost no buffalo are to be found in lowland areas like the Palu Valley. Highland farmers do not harness buffaloes to ploughs, rather they use large numbers of buffalo led around and around the field to trample the soil in preparation for transplantation of rice seedlings. Buffalo may also be used to pull carts, although cattle are often used for this task. Traditionally, buffalo are the most expensive and most significant part of brideprice, and also constitute the major component of traditional fines paid as compensation for major infractions of indigenous custom (e.g. adultery, slashings, transgression of sacred land, etc.).

Internal parasitism (worm infestation) was identified as the most common problem associated with buffalo. Farmers considered mud or mud covered grass to be the source of infection. They also suggested that maternal transmission *in utero* could occur. Farmers reported that newborn calves could die immediately due to this condition (however, from a veterinary perspective there are likely to be a number of other factors that contribute to mortality). Clinical signs attributed to worms were considered the same as for horses, and infection responded readily to local treatment using the bark of a local tree (*lengaru*). Farmers were also aware of anthelmintics that could be obtained from the veterinary aide. However, this aide only occasionally visited the Lindu plain sub-district and there were no animal health posts (*poskeswan*) or private kiosks from which commercially available anthelmintics could be obtained. In the rare case where a buffalo did not respond to such treatment, the owner would slaughter it.

The 'most feared, though rarely encountered' condition was labelled *nolili*, which had the characteristic clinical signs of surra including

aimless circling followed by progressive paralysis proceeding from the hindquarters/loins area until the animal is no longer able to stand. Farmers said *nolili* occurred only during certain seasons, but were unable to specify which season promoted it. Farmers did not know the cause of surra, although the extension agent was able to confirm that surra occurred in the transition period between the monsoons and that it was transmitted by march flies (family Tabanidae). What most mystified them was that it would always attack perfectly healthy, fat buffalo (this is confirmed by experimental studies at Balitvet that showed that buffalo on a high plain of nutrition had higher levels of circulating *T. evansi* compared to animal on a poor diet). This condition was rarely encountered, perhaps only one or two cases occurring each year throughout the whole Lindu plain. However, informants remembered a period in 1996 when several hundred buffalo died in the space of only a few months after manifesting these symptoms (one informant's elder sister lost ten of her eleven buffalo within one month). The sudden decrease in the local buffalo population has had major repercussions not only for the local economy but also the ceremonial system, as the payment of buffalo as the major portion of brideprice has now been largely replaced by cash payments which are far below the value of the actual water buffalo that used to be paid. However, those female buffalo that survived a *nolili* epidemic were said to be unusually fertile, producing far more offspring than buffalo usually do.

Interestingly, although classing schistosomiasis as the greatest threat to human beings at Lindu, farmers did not regard it as a significant problem for livestock. The Lindu plain is one of only two areas in all of Indonesia, the other being the highland Napu plain to the east, the source of many of the streams feeding into Lake Lindu, in which schistosomiasis is to be found (Whitten et al. 1987). Despite continued draining of focal areas in which the intermediate snail host has been found and administration of praziquantel by the health department to human beings whose faeces samples confirmed infestation by schistosomiasis, surveys carried out annually at Lindu in the mid-nineties by the BPPH Maros (before funding disappeared in the wake of the economic crisis (*krismon*) beginning in 1997) indicated the continuing problem of schistosomiasis infestation among livestock (Effendy, pers. comm.).

4.2d Cattle (*Japi*)

Lindu livestock owners had the least to say about diseases of cattle (*japi*). Cattle play a smaller part in the local economy than water buffalo, sometimes being used as draught animals for carts along the muddy trails, but never for working the fields. For the most part, they are only raised for their meat, which is served at celebrations like weddings. Bulls are usually sold, while cows are retained as long as they are fertile. As in the case of horses and water buffalo, infestation with worms (*nakalindoroa* or *cacingan*) was the primary complaint for cattle, with the same etiology (i.e. inadvertently ingesting worms with the fodder or mud that they consumed) and breakdown of types as listed above for buffalo. However, one farmer noted that worms were even more common among cattle than among horses and buffalo. He also opined that the smaller, shorter worms (*ganggalaa*) that tended to stick to the large intestines were the most common type to infest cattle. Although the symptoms of *nakalindoroa* (in its more generic sense, covering all worm infestations) paralleled all those listed for horses and buffalo, the most common symptom for cattle was diarrhoea. If untreated, cattle could develop a crooked back as well, a sign of imminent death. Treatment also paralleled that for buffalo, with modern anthelmintic medicines being preferred if available.

Cattle were not reported to display the range of other diseases afflicting buffalo. There was no mention of any skin diseases nor of any eye infections. Nor had Lindu farmers ever heard of such diseases as anthrax or SE, hence contrasting with the general knowledge of their counterparts in Maros. However, one other condition was of concern to livestock owners: the mad cow (*japi nagila* or *sapi gila*). Such a condition was certainly uncommon—only one farmer mentioned having encountered it twice—but was considered inevitably fatal; any attempt at medication or other treatment was useless. There were no symptoms other than strange behaviour, usually involving aimless running into objects, such as houses, field huts, or fences; death usually occurred shortly thereafter. There was nothing to be done but either to watch the cow die or slaughter it, with the meat being eaten by the owning family and distributed for sale to other villagers. As in the case of beasts that have died of other causes, such meat was considered safe to eat, as long as it was boiled or otherwise cooked for long enough.

4.3 General Characteristics

Despite the differences between the two regions there are commonalities between the understandings of the livestock-owning farmers in Maros, South Sulawesi, and Lindu, Central Sulawesi. The most evident shared characteristic is the tendency to label cases of illness by a salient symptom rather than by an aetiological factor. In this regard, ethno-labels thus contrast with Western scientific characterisations. For example, whereas the scientific label for surra is trypanosomiasis, referring to a condition caused by trypanosomes (specifically, *Trypanosoma evansi*) as the aetiological agent, this disease among horses is labelled **cakiki** by the Bugis farmers and **nakompe** by the Lindu farmers, both terms referring to the stomach area of the horse becoming ever smaller, in the former case described as ‘rising’ and in the latter as ‘deflating’. In such an instance, it is easy to ascertain that one is dealing with the same referent, i.e. livestock trypanosomiasis or surra.

However, labelling diseases by singular symptoms does lead to major differences with scientific understandings. While Western veterinary science understands surra to be the same disease whether attacking horses, buffalo or cattle, there is no such perception of sameness for these farmers. The problem is that although the same agent may be active in the aetiology of the diseases in different livestock, the salient symptoms may be very divergent. Buffalo infested with trypanosomes do not manifest the same symptoms as horses. Hence farmers in Maros and Lindu did not recognise buffalo as suffering from what scientists would label the same disease precisely because their disease classifications and understandings are primarily symptomatically rather than aetiological based. These two groups of farmers also recognised different cardinal signs for surra in the case of buffalo, (i.e. hind-limb paralysis in Maros and aimless circling in Lindu), whereas in horses they classified the disease based on the same cardinal sign. In both cases, however, this condition is not related to the ‘shrinking stomach’ (**cakiki** or **nakompe**) syndrome of horses. And since there seem to be no salient and unique symptoms of surra recognised for cattle in both regions, it is simply not part of their respective classifications of cattle disease.

Of course, one of the reasons for labelling diseases according to symptoms rather than etiological agents is that most of these agents, whether viruses,

bacteria, schistosomes or trypanosomes, cannot be observed with the naked eye compared to lice and worms that do not require magnification for identification. In the case of worms the disease syndrome is classified according to the appearance of the worms and not the clinical signs exhibited by affected animals.

Given this tendency, it is important to distinguish those livestock diseases in which the symptoms cluster together simultaneously and those in which they develop consecutively as different phases of a disease. Diseases are not always labelled by the first symptoms to appear. Sometimes the sign defining a disease is indeed the first to appear, for example, mucus emission in case of horse flu according to Bugis farmers. However, for other conditions it is sometimes not evident what the disease is until the definitive sign becomes evident in a later phase, although initial symptoms do give a good clue as to what disease is developing. The best example of this is, of course, surra or animal trypanosomiasis, since the symptom of a 'rising' or 'deflating' stomach (*cakiki* or *nakompe*) does not appear in horses until late, unfortunately when it is regarded as too late to treat the animal.

Identifying diseases by salient symptoms rather than aetiological agents also has consequences for modes of treatment. For example, local 'village' modes of treating horses suffering flu in both areas surveyed are the same.

With regard to disease management, both groups recognised diseases that respond to local treatments, those that require modern treatments (most often injections of one sort or another) and those for which nothing avails, with prophylactic measures being the only means of management. Bugis farmers in Maros could resort to treatments offered by specialists in treating the diseases of particular livestock but Lindu livestock owners had to rely on their own individual knowledge in the absence of such specialists. Farmers in both areas, however, also voiced a preference for modern modes of treatment, but noted the necessity to resort to traditional 'village medicines' due to the unavailability of medicines, the infrequency of visits by veterinary aides or paramedics, and the expense of such treatments.

5 Changes in Government Administration of Livestock

5.1 General Background

As a response to secessionist threats and to demands that a greater share of resource revenue be kept by the areas where resources are exploited, the Indonesian government instituted a process of regional autonomy. This was designed to preserve the unity of the integrated Republic, though within a more federal framework. The need for such legislation was exacerbated by the economic crisis of 1997–98. Despite the relatively rapid recovery of neighbouring countries, like Malaysia, Indonesia has yet to emerge from the economic downturn. Social conflicts rapidly escalated in the wake of the economic crisis, with indigenes and migrants, Christians and Muslims, radical students and fundamentalist Muslim youth, secessionist groups and the military, the outer regions and the central government, and various other opposed social and political groups all becoming more polarised and even resorting to open combat. Regional autonomy (*otonomi daerah* or *otoda*) was presented as one way of addressing the inequalities underlying such conflicts. It would do this by redressing the centrist orientation of the New Order, which had produced an imbalance of industrial development and financial concentration favouring Jakarta and its Javanese hinterland while neglecting the outer islands of the archipelago.

The legal basis of regional autonomy was established in two laws passed in 1999, number 22 concerning regional governance and number 25 concerning the financial balance between the centre and the regions (GOI 1999). Although most of the provisions of these laws were not to be implemented until the beginning of 2001, many changes began to be phased in during the preceding two years. In an attempt to forestall the increasing power of the provinces and demands for even greater autonomy or independence, the focus was placed on granting autonomy to regions at the level below the provinces, the regency¹⁶ or *kabupaten*, and expanding the powers of its head, the *bupati*. Government officials now routinely note that the *bupati* is more powerful than the governor

(*gubernur*) of the encompassing province (*propinsi*).

The *bupati* now has the authority to reorganise all government offices and redefine the functions of officials, in a reversal of the national standardisation of regional administration to village level imposed by the 1974 regional government law (*Undang-undang Nomor 5 Tahun 1974 tentang Pokok-pokok Pemerintahan di Daerah*) and the 1979 village government law (*Undang-undang Nomor 5 Tahun 1979 tentang Pemerintahan Desa*). Many of the reports issued by *kabupaten* offices have focused specifically on laying out the changed organisational structures of governance at the regency level (e.g. Bupati Maros 2000).

Of course, the reciprocal side of greater autonomy, including both a greater share of the profits of local enterprises and expanded administrative control, is the need for the regencies to generate their own income to support their greater autonomy. Salaries (*gaji*) of regency-level government officials are now the responsibility of the *kabupaten* rather than being paid by the central government. Although certain sectors are still nominated as under central government control (e.g. mining, the chain of national parks across Indonesia), most government agencies receive funds only for projects for which the central government remains responsible. Such funds translate into honoraria (*honor*) for officials involved in specific projects, rather than routine

¹⁶ Sometimes the term *kabupaten* is translated as district, although in other accounts the term district may be used as a translation for the next lower level, the *kecamatan*. To avoid this ambiguity I use the standard translations regency for *kabupaten* and sub-district for *kecamatan*. Part of the problem of translation stems from the Dutch colonial system of administrative classification, where the *kewedanaan*, headed by the *wedana*, was considered the district in Dutch. Because the *kewedanaan* was an administrative layer found in Java during the colonial period, but absent in the less densely populated outer islands, it was not carried forth into the administrative hierarchy for independent Indonesia as this was standardised through various reforms beginning in the 1950s. Hence, the colonial ‘district’ level has dropped out of the Indonesian administrative system, and the term is best avoided.

salaries. This change in the source and distribution of funds has had significant ramifications, especially for officials at the lowest levels of official hierarchies, such as agricultural extension agents (PPL) working in villages who previously received salaries guaranteed by the central government. As a result of administrative reforms and financial shortfalls at the *kabupaten* level, many PPL now no longer receive regular salaries.

Such experiences vary widely across provinces and, more importantly, even across regencies within the same province. Regional autonomy has delivered winners and losers. Resource-rich provinces, such as Aceh, with its natural gas, Riau and Kalimantan Timur, with their oil reserves, and Papua (Irian Jaya), with its gold, copper, and other minerals, have emerged as clear winners in this process. Even within Riau province itself, the regency of 'Island Riau' (Kepulauan Riau) has now demanded separate status as a province, seeking to exclude its fellow Riau regencies on the eastern coast of Sumatra from a provincial share in its oil revenues. Many regions of South Sulawesi and Central Sulawesi that depend only upon agricultural production for revenue, count themselves among the 'losers' of this process, struggling to generate revenue sufficient to fund their regency administrative offices. Of course, such 'losers' have been slower to implement the reforms of regional autonomy, in part due to their very lack of revenue. Other regions within Sulawesi that do support export income-earning activities have proved more progressive in that regard.

As a result of such regional disparities, there is no longer any standard hierarchy and range of government offices at all levels, and changes to administrative structures at regency level have been significant. The prioritisation of departments tends to follow the economic profiles of the region, such that where fisheries are an important part of the local economy, there may be an independent Department of Fisheries coordinating activities with a Department of Agriculture; however, where fishing is relatively unimportant, there will be a fisheries sub-department within the Department of Agriculture. Functions such as extension will also be assigned priority relative to the economic significance of the sector.

Regencies such as Maros in South Sulawesi and Donggala in Central Sulawesi have assigned animal husbandry services to sub-department status within the Department of Agriculture, whereas the

municipality of Pare-Pare, an administrative unit at the same level as a regency, has discontinued any type of office whatsoever overseeing livestock. Across regencies in South Sulawesi there is a range of combinations and amalgamations of the four sectors formerly serviced by separate departments before regional autonomy (agriculture/food crops (*pertanian/tanaman pangan*); animal husbandry/livestock (*peternakan*); fisheries and seas (*perikanan dan kelautan*); and forestry and estate and garden crops (*kehutanan dan perkebunan*)).

The *bupati* also determines the allocation of funds received by the *kabupaten* directly from the central government¹⁷ in accord with his evaluation of the economic needs and potential of the regency. Before regional autonomy, offices like the Bureau of Agricultural Extension Information (BIPP) could be assured of funds to maintain supplies and fund the activities of its extension agents. There is no longer any certainty that such funds will be forthcoming. Each department must submit an annual budget request, which is evaluated by the *bupati* and the regency-level parliament (DPRD or *Dewan Perwakilan Rakyat Daerah*). In fact, extension officials in Maros complained that funds formerly assigned by central design to extension services now tended to be allocated to other activities. Where previously independent coordinate departments have been amalgamated as (subordinate) sub-departments within a larger single department, such as the integration of animal husbandry into agriculture, budgets have been correspondingly reduced, resulting in a reduction of services. Routine functions, such as annual censuses of livestock ownership or disease prevalence, now depend upon special project funds and may be delayed for years.¹⁸

The following two sections outline the implications of some of these changes for the organisation and provision of services in animal husbandry for Maros and Donggala regencies, the two areas in which

¹⁷ The *kabupaten* now only receives funds from the province (*propinsi*) in order to finance specific programs and projects overseen from the provincial level rather than for maintenance of administrative offices.

¹⁸ The head of the Sub-department of Animal Husbandry in Maros declared that funds allocated to his office had been slashed by fifty percent compared with the situation when it was a department on its own, although the funds allocated to the Department of Agriculture as a whole have tended to increase under regional autonomy.

farmers were interviewed regarding their experience of livestock diseases.

5.2 Administrative Changes in Maros Regency

Compared with many of the other regencies within Sulawesi as whole, and even within South Sulawesi, Maros is a showcase *kabupaten*, a pilot site for many development projects and home to many offices whose ambit covers not just the regency, but many of the provinces of eastern Indonesia.¹⁹ Given its location immediately to the north of the provincial capital Makassar, it is easily accessible to the provincial-level offices in the capital and boasts a level of infrastructure in its own regency capital, also named Maros, that compares favourably with many sections of the city Makassar itself.

Formerly, the administration of animal husbandry (*peternakan*) matters was performed by its own department or agency, the *Dinas Peternakan*. However, as part of the reorganisation of the regency's services in the wake of regional autonomy, it now functions as a subdepartment (*subdinas*), amalgamated with three others, covering fisheries and seas (*perikanan dan kelautan*), food crops (*tanaman pangan*), and forestry and plantations/garden crops (*kehutanan dan perkebunan*), within an expanded Department of Agriculture (*Dinas Pertanian*). The *Subdinas Peternakan* contains four sections—facilities or means (*sarana*), production (*produksi*), product processing (*pengolahan hasil*), and technology (*teknologi*). Of equal status to the subdepartment head (*kepala subdinas*) is its head of administration (*kepala tata usaha*).

At the sub-district (*kecamatan*) level, the agriculture department is represented by the KCDP (*Kantor Cabang Dinas Pertanian*), a branch (*cabang*) of the Department of Agriculture, whose head operates from the office complex of the sub-district head (*camat*), with whom he coordinates his activities. In some sub-districts, especially those formed recently, the KCDP may be comprised of no more than this single person, while in others there may have a full complement of staff. The branch heads coordinate agricultural activities with the extension agents who work within the sub-district. However,

¹⁹ For example, as noted above, the ambit of the BPPH in Maros encompasses not only all of Sulawesi, but Maluku and Papua (Irian Jaya) as well.

the KCDP's own officers (*petugas*), where found, are the ones who are usually notified by farmers of outbreaks of illness or other problems. In the absence of such staff, such problems must be reported to extension staff or directly to the BPPH, if the farmers reside nearby.

Livestock extension services have been amalgamated into the more general agricultural extension services that are organised by the KIPP (*Kantor Informasi Penyuluh Pertanian* or Information Office of Agricultural Extension). The KIPP is the latest version of extension coordination offices. The office currently contains three structural sections—information and communication services, development and institutionalisation of farmers and extension, and development of programs and extension programs. The office also has its own administration and chain of functionaries, down to the PPL (*penyuluh pertanian lapangan* or field agricultural extension agents) in the villages, involved in the operational tasks of extension. Although the *Subdinas Peternakan* and KIPP belong to separate bureaucratic hierarchies, they cooperate and coordinate their activities, especially those relating to use of and education about technology.

The KIPP operates as a structural unit at the regency level and oversees the functional or operational²⁰ unit, the BPP (*Balai Penyuluhan Pertanian* or Bureau of Agricultural Extension) located in each

²⁰ One of the keys to understanding the Indonesia bureaucracy is the distinction of structural and functional positions. An analogy with Australian universities is useful. Universities are structured by a series of administrative levels, moving upward from the head of department through the head of school to the head of faculty and on to the vice-chancellor. Indonesian bureaucratic chains are similar structures, with each level being labelled an *eselon* (i.e. echelon) and assigned a Roman numeral, with sublevels within the echelon noted by capital letters. However, just as a university requires not only an administration, but also a set of functional or operational agents (i.e. teachers, researchers, etc.), also organised in its own hierarchy, so too Indonesian bureaucracies have an independent hierarchy of operational or functional positions. Lower level workers tend to be merely functional (*fungsional*), while their managers occupy structural (*struktural*) positions. Needless to say, occupants of structural positions tend to have greater security and receive extra allowances in addition to a set salary, while those with only functional status are less secure, sometimes only drawing honoraria (*honor*) from specific projects rather than full salaries, and often have no fixed office quarters. Agricultural extension agents operating in the villages under the supervision (theoretically) of the BIPP are merely functional workers.

subdistrict (*kecamatan*) within the regency. The primary function of the BPP is to develop the specific program of agricultural extension tasks for the agricultural extension agents working in each village within the sub-district. The BPP also hosts a weekly meeting of all the PPL working in the sub-district, as well as coordinating extension work with the programs being run by the head of the KCDP at the sub-district level. In theory, in addition to its head of extension programs, each BPP contains both a coordinator and a supervisor, all of whom oversee the work of the field agricultural extension agents. Such a three-person structure is a result of reorganisation under regional autonomy. New sub-districts created since regional autonomy²¹ often do not have a BPP office, with sub-district-level BPP officers sharing space with the sub-district officials. At the village level, Maros regency has so far maintained a standard of allocating one or two extension agents to each village, although in less well funded regencies, such as Donggala regency in Central Sulawesi, a single agricultural extension agent may have to cover several villages as her/his area of operation.

The functions of these extension agents PPL at the village level can only be understood in the context of a number of pilot programs based upon participatory rural appraisal (PRA) techniques, being trialled in Maros and other regencies in Sulawesi. For example, one such project, named 'Decentralisation of Innovations and Actions in order to Increase the Level of Service (*Desentralisasi Inovasi dan Aksi untuk Meningkatkan Servis*) and known by the acronym DINAMIS (i.e. DYNAMIC), is a pilot project sponsored by the British foreign assistance department DFID (Department for International Development) working in association with the Indonesian government in selected regencies for the term July 2001 to December 2002. This project aims to increase the level of services offered by various regional government offices, including agricultural extension (DFID n.d.).²² DINAMIS aims to prepare written materials, run seminars and training workshops, and provide monitoring and support for database construction to evaluate

²¹ Regional autonomy has witnessed a rapid proliferation in the number of sub-districts and regencies newly created within the provinces, as well as at the provincial level itself, with at least three new provinces already officially inaugurated and at least three others at various stages of implementation.

²² Further information about DINAMIS may be found at the webpage (<http://www.dinamis.info/dinamis/>).

program success²³. In addition, it seeks to promote a participatory and client-focused approach by directly involving local members of society. The DINAMIS project has chosen Bulukumba Regency in South Sulawesi, the site of the largest horse market in eastern Indonesia, for some of its pilot programs, which include raising the standards of government services overseeing the regency abattoir and livestock transport outside the region (<http://www.dinamis.info/dinamis/dinamis/home.htm>).²⁴

Another project with a similar participatory orientation is being piloted in Maros and Gowa regencies in South Sulawesi, as well as in two selected regencies in a number of other provinces throughout the country²⁵. The project is funded by the World Bank under the title Decentralized Agricultural and Forestry Extension Project or DAFEP and is specifically focused on (<http://www4.worldbank.org/sprojects/Project.asp?pid=P059930>)...

'enhancing farmers' capacity to participate in extension activities and in strengthening the capacity of the district [i.e. regency]-level integrated agricultural and forestry extension system, which will promote economically feasible, environmentally sustainable, and socially acceptable farming practices and increased farmers' income'.

It aims to: (1) increase the capacity of farmers to participate in and assume the initiative in extension activities, as well as organising networks and revitalising farmer groups, through the application

²³ For example, one BPP coordinator noted the construction of a database at the KIPP by which the success of livestock vaccination programs could be evaluated. This outcomes-based program provided evaluation based on three sequentially based criteria: (1) How many people actually vaccinated their livestock? (2) To how many other farmers was news of the vaccination spread? (3) Was there any higher income from livestock obtained by farmers after participating in the vaccination program?

²⁴ The orientation pamphlet published by DFID (n.d.) also lists 'training in society-based livestock health' as one of its possible offerings, but I was not told of any such a program already having begun in Maros or any other regency in South Sulawesi.

²⁵ The other eight pilot regencies are located in East Nusa Tenggara, D.I. Yogyakarta, North Sumatra, and Southeast Sulawesi. After a year, ten more regencies, two each in Central Java, D.I. Aceh, North Sulawesi, South Kalimantan, and West Nusa Tenggara, joined the project as 'partners' in order to begin mainstreaming extension proven successful in the pilot regencies. Map 6 shows the distribution of pilot and partner provinces throughout Indonesia.

of participatory extension methods; (2) increase the capacity of extension staff, as well as introducing institutional and management reforms at the regency level in order to strengthen the support and delivery of extension in the regency; and (3) improve extension policy and strengthen central extension support systems through providing degree and non-degree training, as well as technical assistance and project management support. Officials at the KIPP identified the DAFEP program as central to government efforts to foster a bottom-up and problem-focused approach to extension, with farmers theoretically accorded the role of deciding what extension services they wish to be provided each planting season.

This reform of extension and other government services related to agriculture depends in the first instance upon farmers forming their own 'farmer groups' (*kelompok tani*)²⁶ within each village. The most prominent members of these groups, those who are expected to lead others in the implementation of development programs, are termed 'guiding farmer' (*petani pemandu*). These *petani pemandu* are the farmers with whom extension agents work most closely in demonstrating and explaining programs, as they are then expected to pass on the news to other less progressive farmers. The priorities of each farmer group differ, depending upon the commodities most important for their village (e.g. wet-rice and fish ponds for Maros Baru, livestock for Tompobulu, etc.) within the larger profile of sectors most important for the sub-district. Between four and eight farmer groups are found in most villages, though up to sixteen is not unknown. These *kelompok tani* are subordinate at the village level to an organisation of representatives from the constituent farmer groups known as the UPKG (*Unit Pengelola Kelompok Gabungan* or The Controllers' Unit for United Groups). The farmer groups meet before each planting season to decide on the topics for which they wish extension assistance. A combined list, compiled by the UPKG, is given to the extension agents working in that village, who brings it to the sub-district Bureau

of Agricultural Extension (BPP). At the sub-district level the lists from the farmer groups are assembled by a farmer extension team (FET)²⁷, working under DAFEP guidelines for participatory extension, and then forwarded to the regency KIPP. In keeping with the amalgamation of formerly independent offices under the rubric of a now expanded regency-level Department of Agriculture, these farmer groups also include farmers of various subsistence and commercial orientations; correspondingly, their recommendations cover a variety of sectors, ranging across rice-farming, plantation and small-holder garden cash crops, local sugar production, and livestock health.

Once received at the regency level, the farmers' list is evaluated by an extension commission made up of officials from the KIPP and regency-level Department of Agriculture, as well as representatives from the economy and development section of the regency-level government (i.e. the office of the *bupati*), the network of Mainstay [i.e. 'Reliable'] Farmers and Fishers (KTNA or *Kontak Tani Nelayan Andalan*)²⁸, the Bureau of Agricultural Investigation and Research into Food Crops (BPTP or *Balai Pengkajian dan Penelitian Pertanian Tanaman Pangan*), and NGOs concerned with agrarian matters. This commission formulates a prioritised list of extension tasks along with a schedule, which is passed on to the extension officers for implementation at the village level.²⁹ Such prioritisation involves a number of factors, including the number of village farmer groups requesting the service, availability of extension staff, and costs. The fulfillment of a request requiring additional funds may need to be postponed, given the budget decreases that have accompanied regional autonomy for such offices, while one that can be routinely fulfilled by extension staff (e.g. provision of courses) or by mutual cooperation (*gotong royong*) among the villagers, without external input of funds, will tend to receive a higher ranking. This process is undertaken three times a year—in April, August and

²⁶ Farmer groups (*kelompok tani*) are not a recent innovation. They were an integral part of the rice intensification program under BIMAS, serving as the first step toward the gathering of farmers into village cooperatives (KUD or *koperasi unit desa*). However, the KUD system turned out largely to be a failure due to local corruption, resulting in a system where local entrepreneurs reasserted control and continued their operations 'in the name of the KUD' (Acciaioli 1997).

²⁷ The use of acronyms based on English terms is a sure sign that an organisation has been set up with foreign assistance, often by an internationally funded project.

²⁸ After explaining the difference between 'mainstay farmers' and regular farmers, one KIPP official admitted that the 'mainstay farmers' in Maros just happened to be some members of the regency-level parliament.

²⁹ KIPP officials admitted that for the solution of many problems that were reported to the regency-level Department of Agriculture outside assistance had to be sought, whether from other levels of government or from private entrepreneurs.

December—to follow the rhythm of the three planting seasons.

Extension officers have tended to endorse these changes aimed at greater participation by their clientele. However, they also note the deficiencies in actual implementation of such projects due to insufficient staff and the narrowness of their prior training. An extension agent must now have a diploma at level III³⁰ from an approved Agricultural Extension Academy³¹. There is a limited number of such tertiary training schools in the country where aspiring extension agents can study for these diplomas, and each of these schools offers only a limited number of specialties. For example, whereas the academy in Bogor, West Java, and in Malang, East Java, cover food crops, fisheries, and food crops in their curriculum, the academy in Goa, South Sulawesi, covers only food crops and estate crops, and the in Jogja, Central Java, only food crops, while the academy in Magelang, East Java, concentrates on livestock. To obtain their diploma extension agent trainees have specialise in only one of these sectors.

Extension agents are now expected to operate in a *polivalen* (polyvalent or multi-skilled) manner, providing extension in the full range of sectors covered by regency-level departments of agriculture; not surprisingly, they often do not feel quite up to the task. Although previously the Department of Animal Husbandry would have had at its disposal livestock extension agents, specifically trained in livestock science to at least a level III diploma, now the Sub-department of Animal Husbandry must work with the KIPP and BPP to coordinate programs with agricultural extension officers who may have no specific training in livestock measures and who must allocate their time providing extension on all the sectors covered by the sub-departments of the reorganised Department of Agriculture. For example, extension agents in Maros do not routinely involve themselves in treating animals or taking reports of disease outbreaks; their task is to give information on agricultural topics, not to provide medication. In this regard, the extension agents in Maros differ from those described below for Donggala regency, as some of the latter provide a variety of other services

besides educational instruction, including vaccinations and provision of medicines.

Not surprisingly, given the range of sectors on which they must now provide extension, among the most commonly mentioned recommendations of extension officers who were interviewed was the provision of training courses and apprenticeships (*magang*) in all those fields for which they had been inadequately prepared (e.g. poultry husbandry, especially in dealing with new strains introduced as part of development projects) in their tertiary studies at the agricultural extension academies. Many requested a return to the previous regimen of specialisation, with their limited numbers and currently presumed ‘multi-skilled’ (*polivalen*) expertise replaced by a greater number of agents, each reverting to working in a specific sector. There was a general feeling that the expansion of the range of sub-departments covered by the regency-level Department of Agriculture since regional autonomy had become unwieldy, leading to a neglect of those working at the lowest levels. The extension agents also complained bitterly about the lack of operational funds since the implementation of regional autonomy. They often did not have the means to pay for transport between villages, and all the vehicles that remained in official use were distributed before regional autonomy. Since their salaries are not always paid promptly many extension agents were simply leaving this line of work, frustrated by the range of topics they had to confront, and seeking the security of structural positions with salaries guaranteed by their echelon in a bureaucratic hierarchy rather than persisting with the uncertainty of remuneration in their purely functional positions. Such an exodus could only be stemmed, they asserted, if extension agents were raised to the level of ‘national officials’ (*pegawai negeri*), with guaranteed salaries.

Livestock medicines and other necessities are now largely unavailable through the Sub-department of Animal Husbandry; even when available the lack of subsidies means fewer farmers can now afford them. Most of the Animal Health Posts (*Pusat Kesehatan Hewan* or *Poskeswan*) throughout the regency are no longer functioning, since the veterinarians posted there also subsist on honoraria rather than receiving salaries, and are in any case often unable to perform their duties due to lack of medicines. These veterinarians have increasingly had to rely on establishing private practices, while their assistants (*paramedis hewan*) have also effectively become private entrepreneurs selling medicines, although

³⁰ A level III diploma is a tertiary qualification probably falling roughly between a diploma and advanced diploma at an Australian TAFE.

³¹ Formerly, they only required a high school diploma from a SPMA (*Sekolah Pertanian Menengah Atas* or Agricultural High School).

sometimes coordinated by the KIPP and Subdinas Peternakan.³² As a result, in the era of regional autonomy programs emphasising prophylaxis or prevention of livestock disease and other problems are receiving inadequate attention. Increasingly, farmers have begun to turn back to traditional village methods of treatment; indeed, this was a topic upon which the extension agents requested training.

The general picture is one of considerable uncertainty. Extension officers at the lowest level feel inadequately trained to carry out the range of tasks they are now required to perform as 'polyvalent' or multi-skilled agents. Although the decentralisation reforms have led to empowerment of livestock-owning farmers through networks resulting from projects as DINAMIS and DAFEP, farmers complain about their lack of knowledge in relation to managing the conditions they report and their inability to afford injections and other treatments, if available. Farmers tend to regard the farmer groups (*kelompok tani*) as effective conduits for addressing problems of rice cultivation but as less oriented to issues such as livestock disease. The potential of regionalisation to deliver more appropriate local services is recognised. However, the lesser frequency with which officials such as veterinarians and even the veterinary aide were accessible (and the current unavailability of most medicines), meant the new arrangements were judged to be less effective than the older centralised regimen of more varied and regular services. Even at higher levels of administration, officials complain about the amalgamations imposed by the restructuring efforts of the *kabupaten* government and the chronic shortage of funds for carrying out routine tasks, such as surveys of livestock ownership.

Even those departments, sub-departments, offices and bureaus for which the organisational lines and definitions of responsibilities have been clearly delineated are judged to be suffering from lack of resources. The inability to perform even basic functions is exacerbated where the organisational structures have been rendered unclear by the reforms of regional autonomy. For example, quarantine responsibilities were moved to the National Secretariat by President Abdurrahman Wahid. The government of his successor, President Megawati Sukarnoputri, reconstituted a Quarantine Body within the Department of

Agriculture. Nonetheless, officials admitted that as a result of the truncation of hierarchies produced during regional autonomy reforms, there was little idea of how lower-level (e.g. regency) branches of this body should operate and to what higher levels they should be responsible. As one academic from the Animal Husbandry Faculty of Hasanuddin University pointed out, such lack of clarity could easily facilitate the transfer of diseases like surra, by horses already showing the earliest signs of infestation being shipped from Manado in North Sulawesi to the horse market in Jeneponto regency in South Sulawesi. One consequence of the reduced authority of central and provincial authorities and the establishment of a range of administrative structures and procedures at the regency level, is reduced coordination across the diversely structured regencies. This has created particular problems of detection and control, not only in South Sulawesi but throughout the country, of conditions such as epidemics that do not recognise regency boundaries.

5.3 Administrative Changes in Donggala Regency

Maros represents a progressive regency, having progressed further in administrative reorganisation under regional autonomy than most regencies in Sulawesi. Donggala, however, along with the other regencies of Central Sulawesi, represents a *kabupaten* still preserving many of the administrative trappings of the New Order, while trying to come to terms with the implications of regional autonomy. Reorganisation has proceeded more slowly and conservatively. This is in part because relatively few projects funded by such outside agencies as the World Bank and centred upon capacity-building, social empowerment and institutional reform, have been implemented within the regency with the exception of forestry-based projects. Some administrative reform and reorganisation has occurred; for example, amalgamations similar to those producing the expanded Department of Agriculture in Maros have also taken place in Donggala. As in Maros, livestock affairs are now handled within the Donggala Department of Agriculture. However, in contrast, the Donggala department is divided into five sub-departments: Horticulture (*Hortikultura*), Production of Wet Rice (Paddy) and Interstitial-Season Dry Crops (*Produksi Padi dan Palawija*), Animal Health (*Kesehatan Hewan*); Livestock Production (*Produksi Peternakan*), and Agribusiness (*Agribisnis*). The devotion of two sub-departments to animal health and livestock

³² These trends echo those evident in the demise of the village-level cooperatives (KUD or *koperasi unit desa*) as centres of input provision and marketing for rice production in the 1980s (Acciaioli 1997).

production does indicate a certain concentration upon livestock issues despite the lack of a separate department status for animal husbandry. Indeed, Spencer and Quane (1999: 62) note, '[l]ivestock cattle in the areas [of Central Sulawesi] are a major industry but overstocking has led to serious land degradation in the area.' and display a minor trade flow of 'cattle, poultry, horticulture' from Palu, Central Sulawesi's capital, to East Kalimantan (Spencer and Quane 1999: 8 [reproduced here as Map 1])³³. However, the director of the Animal Health Subdepartment remarked on the current low numbers of cattle in Donggala regency.³⁴ Forestry affairs and plantation crops are regulated by a separate department, reflecting the proportion of the province's area covered by forest (64% [Spencer and Quane 1999: 60]) and the consequent reliance on forest commodities, especially timber (e.g. ebony). However, agricultural extension services have remained under the control of a Bureau of Agricultural Extension Information (*Balai Informasi Penyuluhan Pertanian* or BIPP) at the regency level rather than undergoing the reorganisation that produced the KIPP in Maros.

The differences are even more marked at the lower levels of administration, the sub-district and village. As in Maros, the *Balai Penyuluhan Pertanian* (BPP) at the sub-district level has a coordinator and head of administration to assist the head. However, the office of the sub-district branch of the Department of Agriculture (KCDP) is usually staffed by a 'single fighter', unassisted by the complement of staff found in Maros. At the village level, agricultural extension agents must be *polivalen* (multi-skilled) over an even greater range, as not every village possesses its own resident agent. In fact, officials described a situation under regional autonomy in which clearly delimited 'working areas for agricultural extension agents' had largely disappeared; if there was a particular problem or outbreak in a specific area, then extension agents would be sent there 'swarming in overwhelming numbers'.

³³ Although this map shows a flow of 'livestock, poultry, and horticulture' from both Palu and Ujung Pandang, which has since then reverted to its old name Makassar, to East Kalimantan, this chief investigator's own research indicates that the movement of cattle from Sulawesi to East Kalimantan (as well as to other points as far westward as Sumatra) proceeds from Mamuju on the west coast (see Map 4), about midway between Palu and Makassar.

³⁴ Perhaps the difference in evaluation stems from the dying and selling off of large numbers of cattle since the collection of the figures for the 1995 statistical summary upon which Spencer and Quane (1999: 64) depend.

For the past decade a single extension agent has operated in all four villages of the Lindu plain. In fact, he is settled in the next highland valley to the southwest, Kulawi, where the sub-district capital is located, and only occasionally comes to the Lindu plain, although often staying for several weeks when he does. He admits to not having advanced to the level of a tertiary diploma from an agricultural extension academy, having only graduated from an agricultural high school in Makassar, although he does have a certificate from one three-month short course. But he is proud of having been one of only five out of one hundred students in his high school at the time who studied all four subsectors of the agricultural curriculum rather than specialising in fewer (some only in one). Such breadth has stood him in good stead, for, like his fellow extension agents in Maros and the twenty-two others in Kulawi sub-district who are overseen by the BPP in Gimpu/Lavua, he is expected to be 'polyvalent'. And like them he complains about the lack of training that most extension agents have received to cover all the sectors: 'If one extension agents is an expert in livestock, he is blind in matters relating to wet-rice production. If another PPL knows about paddy production, then he's blind about livestock...' However, his major complaint concerns the fact that despite all his years of service he has never been raised to the status of a 'national employee' (*pegawai negeri*), with a secure salary and position. In fact, his disappointment over this lack of security has led him to admit he is now predominantly a 'private contractor', raising and selling 'Batam pigs'³⁵ which he personally imported from Kalimantan and which he now sells privately to local farmers for Rp. 300,000/head.

In fact, this PPL has been no stranger to animal husbandry in the performance of his 'polyvalent' duties as an extension officer. He has taken responsibilities for injections of animals when farmers have brought them with specific complaints, although vaccination has remained the responsibility of the *mantri hewan* or veterinary aide, who is supposed to visit the Lindu plain at least twice a year.³⁶ This coordination and division of veterinary tasks between the PPL and *mantri hewan* is, in part,

³⁵ These pigs tend to grow heavier more quickly than local varieties, easily attaining 100 kg in only seven months. They also graze well off the abundantly available Napier grass (*Pennisetum purpureum* or *rumpit gajah* [lit. 'elephant grass]).

³⁶ Farmer s estimated that the Lindu plain was actually visited by a *mantri hewan* between one and three times a year.

due to the lack of staffing for animal health facilities. In all of *kabupaten* Donggala there are only three animal health posts (*poskeswan*), all of them located in the lowlands—at Malonas, Moutong, and Sidera. When faced with livestock disease, farmers in the highlands must resort to the *paravet* or *mantri hewan*.³⁷ Only eleven of the eighteen sub-districts (*kecamatan*) in the regency have a *paravet*, while there are only two veterinarians employed by the Animal Husbandry Subdepartment for the entire regency. In fact, the eleven *paravet* are not salaried officials of the subdepartment. They may rather be considered, like the PPL, as private operators (*operator swasta*) or entrepreneurs, buying and selling veterinary medicines on their own, sometimes under working agreements with the subdepartment, residing in specific villages but occasionally making forays into surrounding villages.

In fact, the PPL stated that at the sub-district level the extension and animal husbandry services effectively have merged. Thus, in the context of regional autonomy these services are now similar to those in place prior to the reforms of the early 90s, which established the Bureaus of Agricultural Extension (BPP) and the offices of the sub-district branch of the Agriculture Department (KCDP) as distinct and amply staffed units. In fact, the PPL stated that he effectively worked under the KCDP. He only visited the BIPP in Palu when there was a meeting to announce the results of new research which the PPL were then expected to transmit to farmers. However, his routine tasks tended to be assigned to him by the regency-level Department of Agriculture itself. Recently, more of his work has been in association with NGOs also working in the field of agricultural development.

From a position at the top of the regency hierarchy, the director of the Animal Health Subdepartment confirmed this evaluation of the organisation of extension work. Although the extension agents receive their salaries (or in some cases only their routine honoraria) and can receive promotions within the administrative hierarchy of the Bureau of Agricultural Extension Information (BIPP), the work program for the extension agents is set directly by the regency-level Department of Agriculture. Although nominally supervised by the coordinator of the BPP at the sub-district level, extension agents submit their work reports directly to the *Dinas Pertanian*. That is, whereas the

extension agents are located structurally IN the extension office hierarchy, they effectively work functionally FOR the Department of Agriculture. In theory the extension agents receive their salary from the BIPP, and honoraria (*honor*) from the *Dinas Pertanian*; in reality, the *Dinas*-supplied honoraria have sometimes proven the steadier source of income. Such a situation is thus not unique. Other government services also manifest a dual administrative arrangement, with different lines of command structurally and functionally. For example, the regional [i.e. provincial] animal health laboratory (*Laboratorium Kesehatan Hewan Daerah*) located in Central Sulawesi is structurally subject to the governor's office, but functionally its tasks are assigned by the BPPH in Maros.

Donggala regency has yet to experience the administrative reform that has been enacted in other regencies like Maros. In part, this is due to lack of resources at the regency level to replace the funds from the center that formerly financed government services. However, a major factor is also the relative absence of projects funded by external sources, such as the World Bank, which have tended to accelerate the pace of change in other regencies and provinces chosen as target areas. Officials admit that agricultural extension and other services are still administered in 'top-down' fashion, though they also show a keen awareness of the participatory projects being piloted to introduce a 'bottom-up' orientation elsewhere. Functioning farmers' groups (*kelompok tani*) do not underpin the extension system in Central Sulawesi. While officials are being introduced to participatory schemes for increasing service levels such as the DFID-funded DINAMIS project, they are not yet part of official planning for the regency. Farmers at Lindu expressed considerable satisfaction with the services provided by the local agricultural extension officer. However, the burdens of 'polyvalent' performance across a number of sectors in a region comprising four villages in the absence of guaranteed salaries has led to his burnout; he has turned to independent entrepreneurial activities and has not been replaced. Farmers expressed considerably less satisfaction with the irregular visits by a veterinary aide based in the provincial and regency capital. Given the financial constraints upon activities of the BIPP, the *Dinas Pertanian* and other regency-level offices providing services in the agricultural sector, as well as the absence of projects funded from outside, few reforms seem possible in the short term.

³⁷ Unlike the agricultural extension agents, *mantri hewan* do not have to undergo a rigorous training at the tertiary level.

6 Conclusions and Recommendations

6.1 Farmer Priorities

Although differences exist between Maros and Lindu with regard to farmer perspectives and administrative services relating to livestock, some general observations covering both regions can be made. Livestock-owning farmers in both areas bemoan decreases in the availability and affordability of modern medicines for livestock diseases, for example Naganol for surra among horses. The demise of animal medicine posts (*poskeswan*) has contributed to this situation, as both government-employed veterinarians and veterinary aides have had to become entrepreneurial to survive in the absence of security of salaries.

Farmers are also keen to use artificial insemination and other measures to enhance productivity, especially for buffalo, and request the improvement of infrastructure, such as sealed roads, that would facilitate bringing livestock and agricultural products to markets. In the more remote areas they have had to maintain or return to using traditional village medicines to treat ailing livestock, but this maintenance/reversion is more due to the unavailability and cost (when available) of modern treatments rather than to a belief in the greater efficacy of traditional means of healing. Implementation of foreign-funded projects such as DINAMIS and DAFEP has begun to draw upon the local expertise of farmers and include them as stakeholders consulted in the process of designing and improving particular programs through participatory extension. However, farmers themselves lament their lack of knowledge on such topics as livestock disease and continue to request more intensive extension services with permanently posted (rather than periodically visiting) veterinarians, veterinary aides, and even (especially in the Donggala case) agricultural extension agents.

6.2 Extension Staff and Service Priorities

Agricultural extension agents also complain about the cutbacks in services that have been ushered in with regional autonomy. They find it increasingly difficult to fulfil their mandate of functioning in 'polyvalent' fashion, covering all the sectors—food

crops, estate crops and forestry issues, fisheries, livestock production and health, etc.—now incorporated within expanded departments of agriculture at the regency level. A return to separate extension services linked to distinct departments for these sectors seems unlikely given the financial constraints upon most regencies and the orientation toward 'integrated' services pushed by foreign agencies funding projects. However, in keeping with PPL requests, external agencies could provide assistance in the form of short courses and other training materials that would allow them to gain the breadth of knowledge concerning agricultural matters lacking in their previous training. In the livestock sector such materials could concentrate upon topics such as expanding the understandings of farmers in order to make the transition from a largely symptom-based classification of diseases to one emphasising aetiological factors and agents (e.g. trypanosomes). Such a transition toward understanding aetiology would also allow better comprehension of the bases of treatment regimens aimed at eradication of aetiological agents rather than simply elimination or amelioration of symptoms.

Of course, such materials and courses designed to deliver them will be to no avail unless extension agents and other village-level officials such as veterinary aides are able to receive secure salaries or gain some other sort of financial security. Currently, the trend is for such functionaries to become private entrepreneurs, although still often offering some services that are 'coordinated' by the government departments that had previously offered similar services and subsidised medicines. In fact, some officials make the case for even more entrepreneurialism in the provision of services to allow market forces to lead to the establishment of viable service industries. Yet, despite its merits as a realistic approach, such a reorientation would favour the development of owners of large herds operating in specific locales near such markets, in keeping with an agribusiness orientation, rather than smallholder owners distributed throughout a province. If maintenance of smallholders of livestock were a priority, then some sort of revitalisation of local services, integrating veterinary aides, extension workers and facilities

such as poskeswan would seem necessary. Programs such as DAFEP have noted that ‘the fragmented extension units, with separate agricultural support service offices (Dinas Food Crops, Livestock, and Fisheries), may not be the appropriate structure to address a decentralised, farming systems-based, and participatory support system needed by farmers’ (World Bank 1999: 5). However, without further training of those officials needed to sustain more integrated extension and support services that depend upon knowledge in a number of sectors and without some sort of security of income (e.g. salaries rather than simply honoraria) such an integrated system will simply collapse.

6.3 Future Directions for Collaborative Research and Application

The material presented in this report is largely of a qualitative nature, derived from interviews with both farmers and government officials and from published and unpublished sources. As such, it should be complemented by quantitative data gathered from more extensive surveys, which would require gaining official permission for longer periods in the field and use of more research assistants. As officials themselves admit, current statistical information from branches of the Statistical Office are unreliable and often out of date due to the lack of government-funded surveys since the economic crisis beginning in 1997. Animal health and management surveys designed for BBPH Maros staff by Dr Reid’s ACIAR project will begin to address this deficiency, though comparable surveys for Central Sulawesi are not yet planned.

Although one of the goals of this research has been to present farmer understandings of livestock disease in their own terms gained through such means as open-ended interviews, such a focus could be improved through closer collaboration with veterinary researchers. Some lines of questioning could have been extended had the chief investigator known the Western scientific analogue of the disease being described. Although the presentation of symptoms for each local disease category may allow the reader with sufficient background of the approximate equivalents in Western scientific categories to guess or in some cases definitely determine the disease, this was not usually the case for the chief investigator while in the field. On the other hand, such scientific naïveté also meant that farmers were freer to pursue the logic of their own

descriptions without being lured into a Western veterinary discourse. Nevertheless, joint research by a team containing both anthropological and veterinary expertise may allow for greater translatability of such results in the future.

Due to temporal and financial constraints, only two areas of Sulawesi could be investigated in this pilot study. Certainly, other areas within Sulawesi are deserving of investigation, due to their strategic significance as possible transmission routes for livestock disease. Similar research in both Mamuju and Jeneponto (the sites of the largest cattle and horse markets) in South Sulawesi, as well as in Tana Toraja, where buffalo are most often sold, might indicate whether animals showing symptoms of various conditions, including surra, were simply shipped to other destinations, treated or slaughtered on the spot. More detailed investigation of marketing channels, to ascertain how these animals are brought to the markets and their destinations once sold, would contribute to the improvement of control measures—a major aim of the larger research project ‘Development of diagnostic and control methodologies for animal trypanosomiasis (surra) in Papua New Guinea, Indonesia and the Philippines’, headed by Dr Reid.

One priority region for further research is Southeast Sulawesi. While South and Central Sulawesi provide cattle to provinces further to the west in Indonesia, the flow of cattle to the eastern provinces appears to come from Southeast Sulawesi. Spencer and Quane (1999: 72) note that cattle production is a major industry in that province, particularly smallholder-owned Balinese cattle. Endarto (2002) also highlights Southeast Sulawesi as one of the sources from which Papua/Irian Jaya has imported cattle, some of which test serologically positive for surra. It is thus possible that cattle infected with surra and other livestock diseases might make their way from Southeast Sulawesi to Papua and thence across the border to Papua New Guinea. Understanding attitudes toward cattle disease on the part of To Laki, Moronene and other ethnic smallholders in Southeast Sulawesi, as well as their decisions in regard to slaughter or sale of sick animals in that province would assist in the preparation of extension materials that could limit the transmission of diseases to the eastern parts of Indonesia. On similar grounds, comparative research on the islands of Sumbawa within NTB and Sumba within NTT, identified by informants as likely sources of cattle exported to the east, would also prove useful.

Control measures based on quarantine regulations, a conspicuously confused domain in the contemporary political framework, and other related methods of surveillance will certainly need to be strengthened. This study has highlighted some of the burdens felt by agricultural extension officers required to provide services in a 'polyvalent' manner to farmers in all the sectors now covered by regency-level departments of agriculture. Equally important is the need to investigate how the regencies, now that they have become more autonomous in designing their own departmental profiles and allocating administrative tasks, can coordinate measures to battle conditions, such as pest infestations and *cattle epidemics, that do not recognise kabupaten boundaries*.³⁸ While the Indonesian government has stipulated that certain matters, such as administration of mining and of national parks, require coordination from the national centre, livestock issues have not received

the same consideration. An integrated approach to dealing with livestock disease must consider not only farmer understandings, local administrative reorganisations and redefinitions of tasks, and the interface between them, as in this preliminary study, but also confront the problems of national integration in regard to economic, political, legal, and social regulation eroded by the devolution of administrative responsibility and financial burden imposed during the era of regional autonomy.

³⁸ The focus of one of the DINAMIS programs in Bulukumba upon improving services related to livestock movement outside the *kabupaten* may be seen as an attempt to address one of the inter-regency concerns that have tended to be ignored with the implementation of regional autonomy.

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- http://www.walhi.or.id/BERITA/Lembar_fakta_dongi2.htm
- <http://www4.worldbank.org/sprojects/Project.asp?pid=P059930>

9 Maps

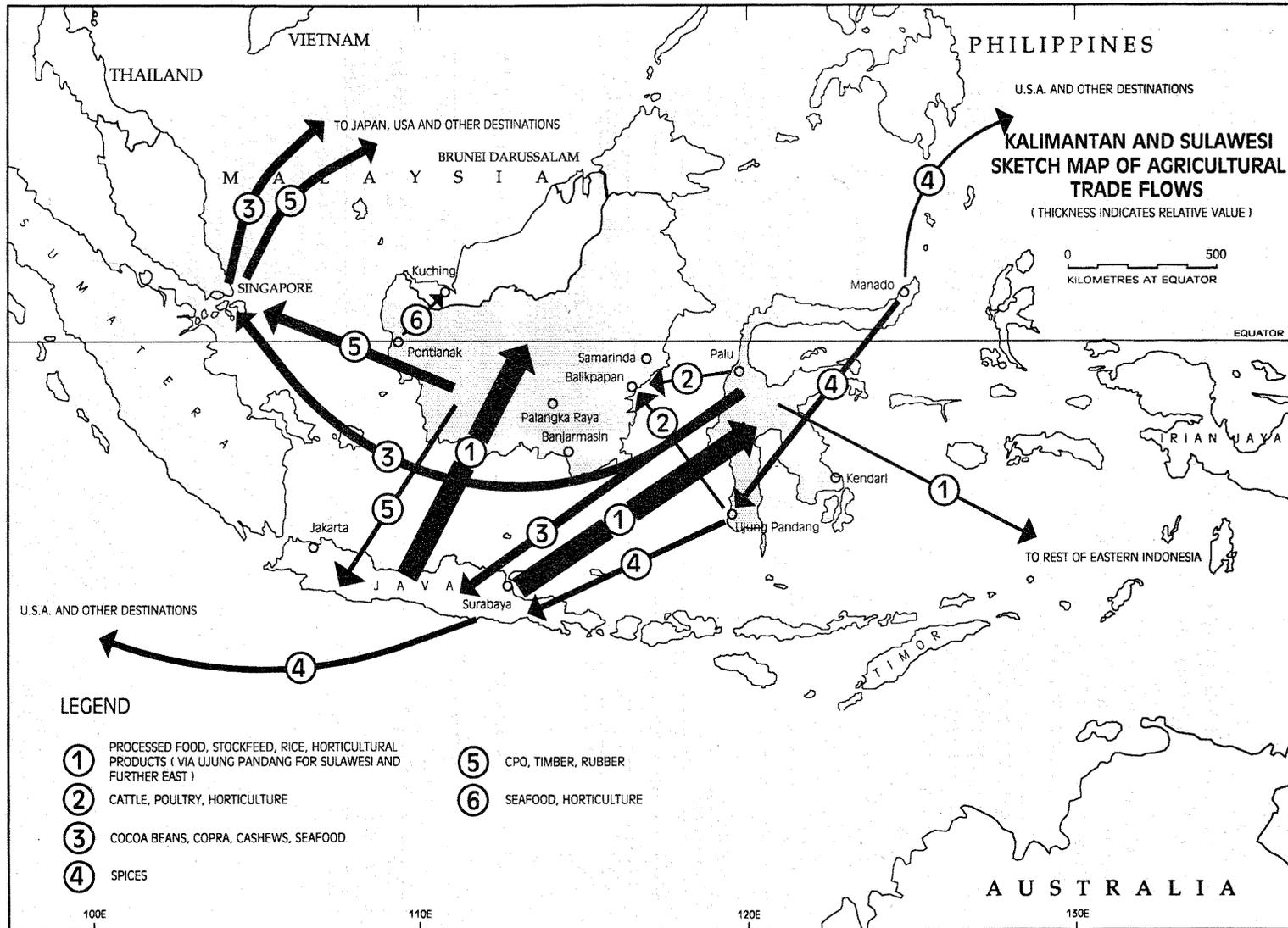
Map acknowledgments

Maps 1 and 3 from Spencer and Quane (1999).

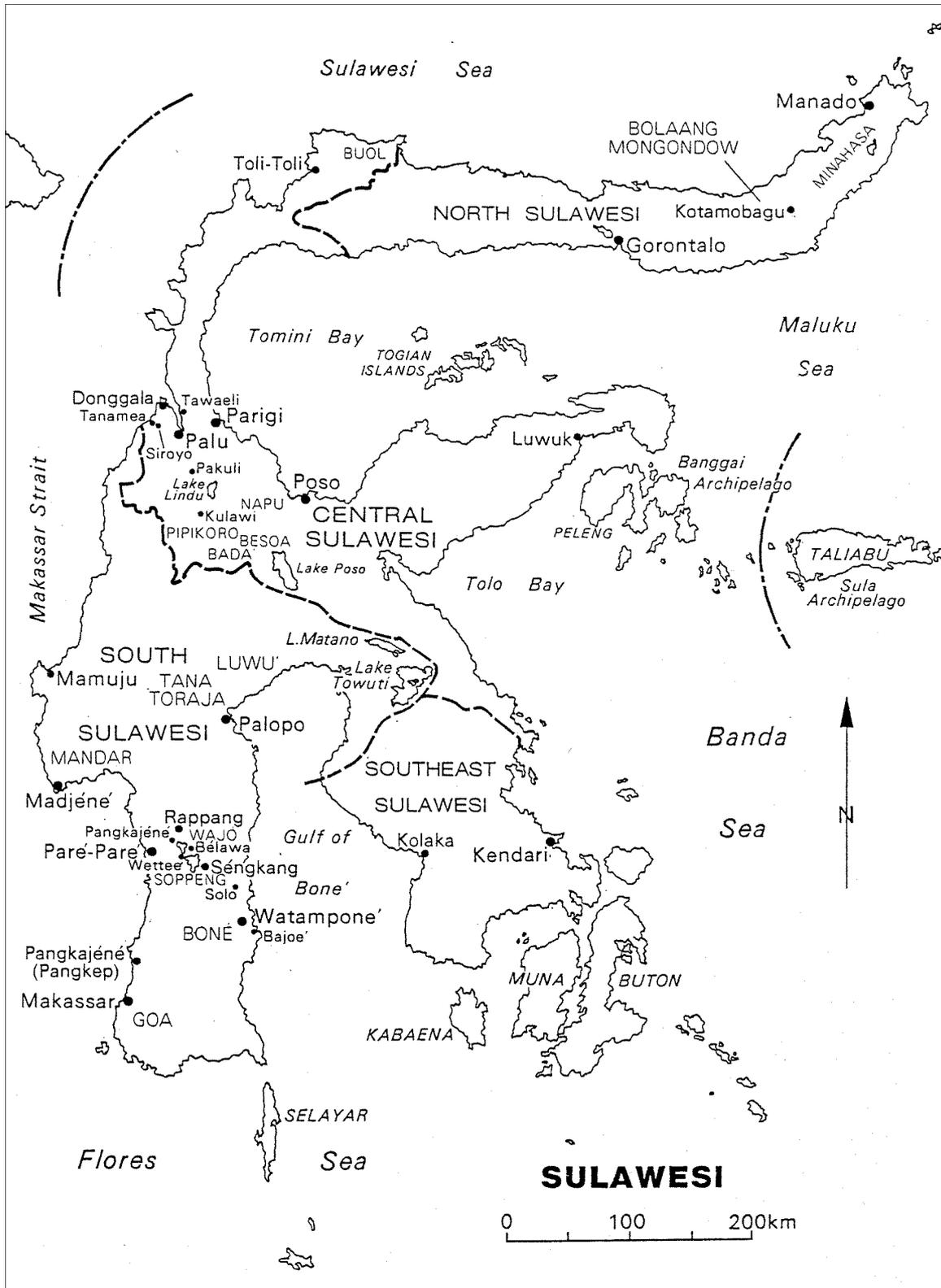
Maps 2, 4, and 5 from Acciaioli (1990).

Map 6 from World Bank Project Appraisal Document for Indonesia—Decentralized Agricultural and Forestry Extension Project (August 5, 1999) available through web page <http://www-wds.worldbank.org/servlet/WDServlet?pcont=details&eid=000094946_99091105544761>.

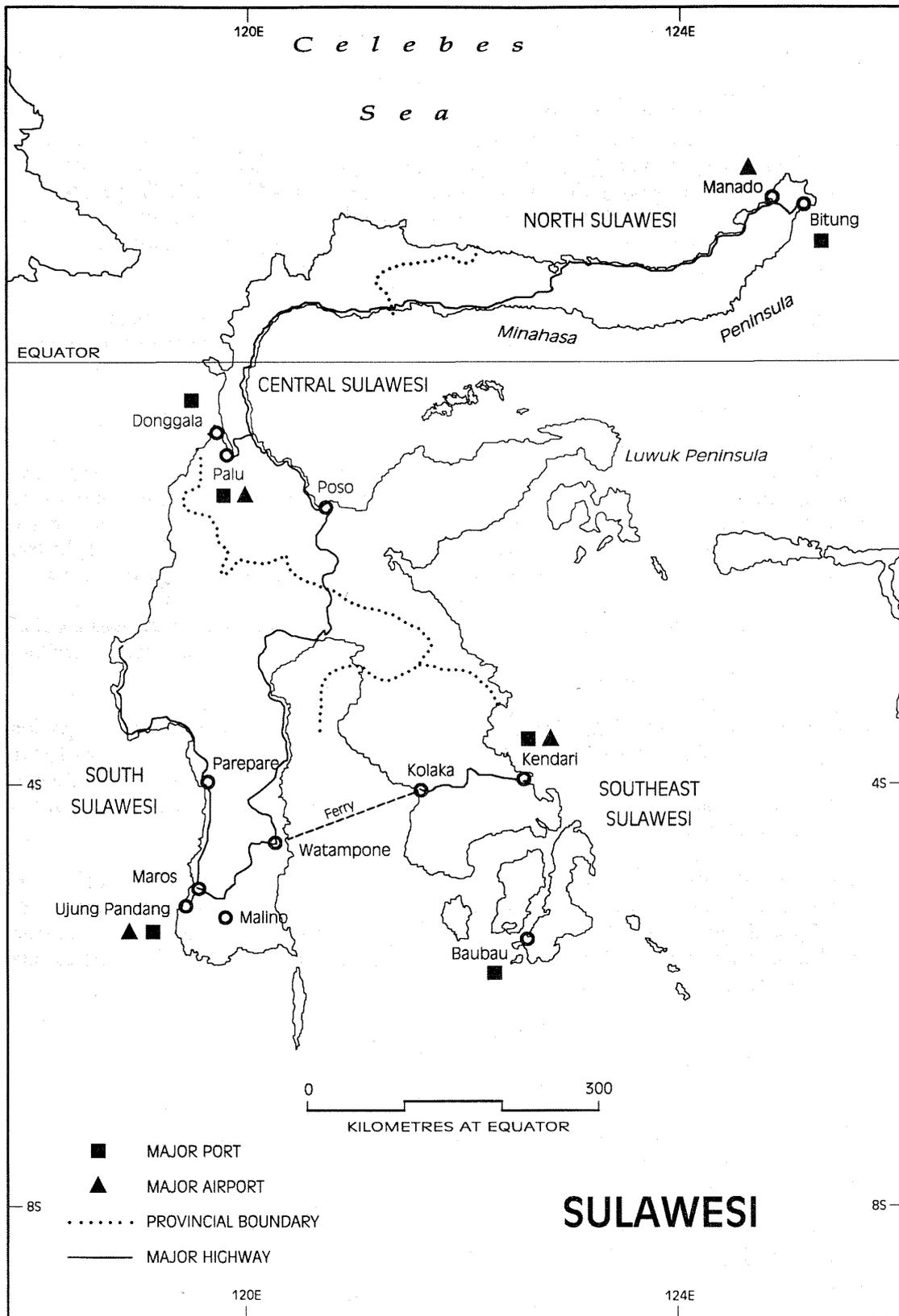
Map 1. Sketch map of agricultural trade flows



Map 2. Sulawesi: the four provinces



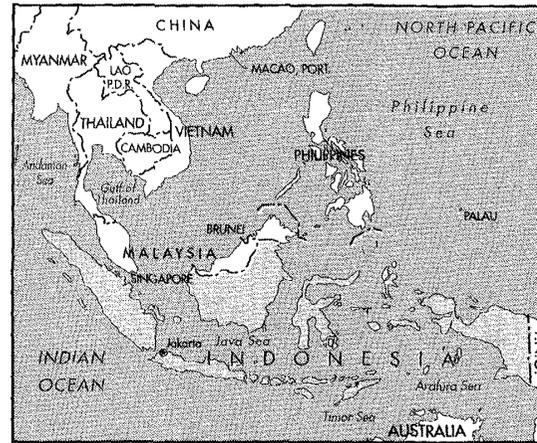
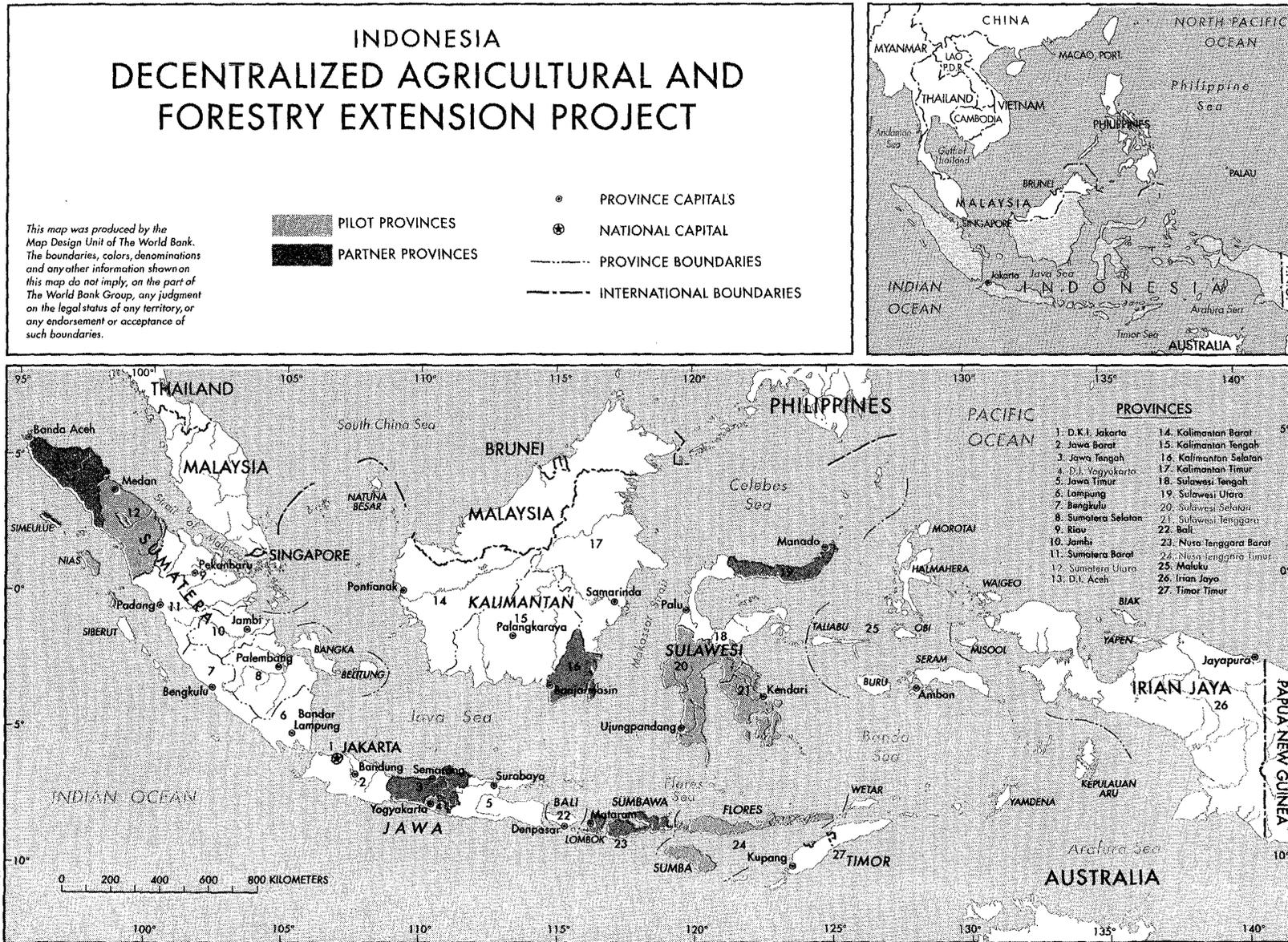
Map 3. Sulawesi: transport links



Map 4. South Sulawesi regencies



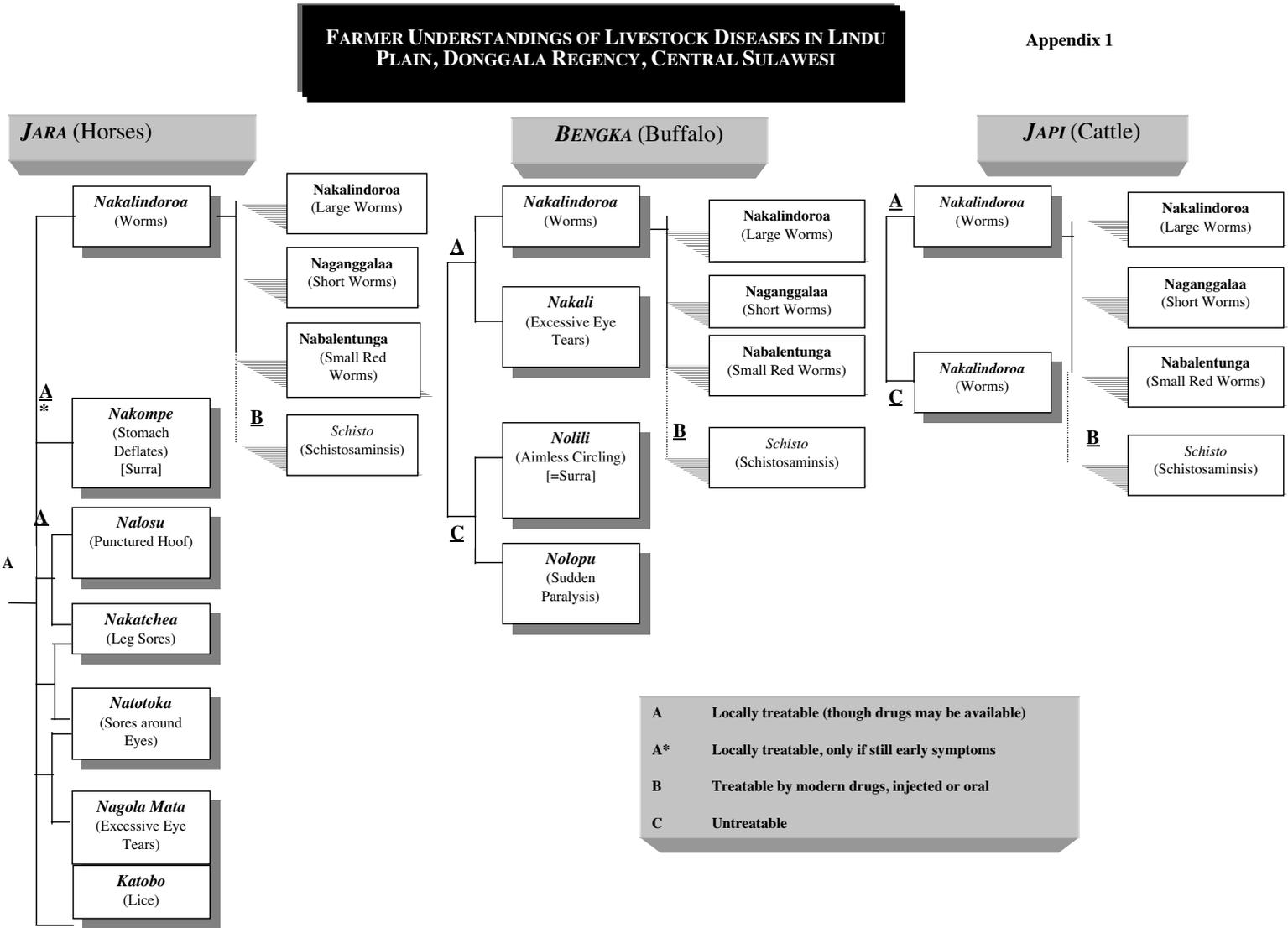
Map 6. Indonesia: decentralized agricultural and forestry extension project



Appendix 1

Farmer understandings of livestock diseases in Lindu Plain, Donggala Regency, Central Sulawesi

Appendix 1



Appendix 2

Farmer understandings of livestock diseases in Maros Regency, South Sulawesi

Appendix 2

