平成10年度
帰国研修員フォローアップ調査団報告書
―家禽疾病の診断技術―

平成11年6月

国際協力事業団
大阪国際センター

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帰国研修員フォローアップ調査団報告書
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序文

この報告書は、国際協力事業団大阪国際センターが実施した一般特設研修「家禽疾病の診断技術コース」（平成５年度開始）に参加した帰国研修員に対するフォローアップ事業の一環として派遣した調査団による現地調査の内容をまとめたものです。

本調査団は、平成１０年１１月８日から１１月２０日までの１３日間、ネパールとスリ・ランカの２ヶ国を訪問し、帰国研修員所属先機関、帰国研修員の活動状況および当該分野における各国の実情の把握に努め、必要に応じ助言を行いました。

本報告書が、各国の獣医学の現状、帰国研修員の活動状況などについて関係各員の一層深いご理解をいただくための一助となり、今後の獣医・畜産分野研修コースの改善、ひいては研修員受け入れ事業の改善に資することができれば幸いです。

なお、本調査団派遣にあたりご協力をいただいた在外公館他関係機関にあらためて謝意を表します。

平成１１年６月

国際協力事業団
大阪国際センター
所長　田上　実

（ネパール）国家計画委員会事務局 (National Planning Commission Secretariat) にて、V. Parajuli, Under Secretary と Kapil Drasad Sharma, Section Officer と

（ネパール）トリブワン大学

（スリ・ランカ）獣医学研究所 (Veterinary Research Institute) にて

（スリ・ランカ）マキシハウス（Maxie House (PVT) LTD.; 家禽精肉所）

目次

I.「家禽疾病の診断技術」研修コースの概要

1.研修コースについて

（1）研修目的は、開発途上国の研修員に対し、家禽疾病の診断技術を講義および実習により習熟させ、家禽疾病および食肉の衛生管理の重要性を認識させることにある。
（2）大阪府立大学農学部獣医学科で、荒川皓教授がコースリーダーとなり、平成５年度８月から毎年６名ずつ受け入れ、これまでの５カ年間で１５ヵ国から合計３０名の研修員を受け入れている。
（3）研修は例年８月下旬から開始し、翌年の３月上旬までの６か月間強で、大阪府立大学では、９月下旬から５ヵ月間の技術研修を行っている。

2.研修コース実施の背景

（1）開発途上国では、蛋白供給源として家禽が重要視されている。特に、肉用・産卵用の鶏の生産は著しく増加してきている。
（2）鶏は他の畜肉と異なり、肉・卵は宗教や生活習慣の制約を受けず広く人々に消費されている。
（3）家禽産業の発展は、家禽および飼料作物の改良・生産技術の改善によるが、家禽の衛生管理、特に疾病の予防・治療技術については開発途上国への移転はまだ十分とはいえず、技術移転および人材育成の必要性が生じている。

3.大阪府立大学での研修コースの実施経緯

（1）平成６年４月の大阪国際センター設立数年前、研修事業部では１万人の研修員受入れを目標とした受け入れ人数増加を計画した。
（2）大阪国際センターの前身である大阪国際研修センターでは地域の特色を持ったコース創りのため、財団法人「千里文化財団」に調査を依頼、昭和６２年１１月に「大阪国際研修センター移転に係る調査報告書」という成果品を得た。
（3）この報告を受けて、研修コース実施の可能性についてセンターから大阪市を始め、様々な関係機関にコース実施の問いかけをしており、農業・畜産分野に１００年以上の歴史を持つ大阪府立大学へも当センターから依頼を行った。
（4）大阪府立大学農学部としての回答は６～７コース実施可能だったとのことである。
（5）農学部獣医学科としては、内部事情もあり、一時は「家禽疾病の診断技術」のJICAへのオファーを止めようと考えていたが、開発途上国への援助は可能な限り行うべきと考え、幾人かの内部講師を説得し、コースの実施を決定したとのことである。（定員については、JICAから当初９名で実施して欲しいとの依頼をしたが、キャパシティーの関係上６名の受け入れに落ち着いた。）

II. 派遣チームの概要

1. 派遣目的

過去５回の研修成果を確認し、今後のコース改善に資するために本フォローアップチームが派遣されることとなった。

派遣チームの目的は、１）帰国研修員所属先などを訪問し、研修の成果が現地においていかに活用され、どのような波及効果をもたらしているかを調査・把握すること、２）現地での公開セミナー開催を通じ当該分野における最新の技術情報を広く関係者に提供すること、および３）当該分野の技術水準、研修ニーズの調査をすることである。

2. 団員構成

総括・団長：	荒川 皓	大阪府立大学　名誉教授
技術指導：	植村 興	大阪府立大学農学部　教授（獣医公衆衛生学）
研修計画：	高橋 満之	国際協力事業団　大阪国際センター　業務課課長代理
業務調整：	高宮 健司	国際協力事業団　大阪国際センター　業務課職員

3. 調査日程

4. 主要面会者

(ネパール)

JICAネパール事務所

長谷川　謙	所長
加藤　高史	次長
工藤美佳子	所員
鉾之原節夫	JICA専門家（鶏病診断）
佐々木正雄	JICA専門家（畜産開発）
高取　一郎	JICA専門家（獣医学）

在ネパール日本大使館

中屋　俊満	二等書記官
西村　英之	二等書記官

一般行政省 (Ministry of General Administration)

Som Lal Subedi	Under Secretary

国家計画委員会事務局 (National Planning Commission Secretariat)

V. Parajuli	Under Secretary
Kapil Drasad Sharma	Section Officer

農業省畜産局 (Department of Livestock Services, Ministry of Agriculture)

Prahlad Sapkopta	Director General

農業省畜産局 国家口蹄疫管理計画 (National FMD Control Programme, Department of Livestock Services, Ministry of Agriculture)

G.N.Gongal	Chief

農業省サラヤン地方畜産事務所 (District Livestock Service Office, Salayan, Animal Health Division, Department of Animal Health and Livestock Services,Ministry of Agriculture)

Bhatt Diker Dev	Veterinary Officer（平成７年度帰国研修員）

農業省チトワン獣医病院 (District Veterinary Hospital, Chitowan, Animal Health Division, Department of Animal Health ad Livestock Services, Ministry of Agriculture)

Bhatt Diker Dev	Veterinary Officer（平成６年度帰国研修員）

ネパール農業調査評議会 (Nepal Agricultural Research Council)

Upendra Mishra	Director
Vijay Chandra Jha	Veterinary Scientist/Veterinary Microbiologist （平成９年度帰国研修員）

トリブバン大学農業・畜産学部 (Institute of Agriculture and Animal Science, Tribhuwan University)

Durga Datta Dhakal	Dean

(スリ・ランカ)

JICAスリ・ランカ事務所

狩野　良昭	所長
尾上　能久	副参事
S. M. Punch Banda	調査担当ローカルスタッフ

在スリ・ランカ日本大使館

野田とも子	理事官

大蔵省対外資金局 (Department of External Resources, Ministry of Finance)

R.V. Nanayakkara	Director
A. Sooriyagoda	Deputy Director

畜産開発・建設省 (Ministry of Livestock Development and Estate Infrastructure)

Prathap Ramanujam　　Secretary

家畜生産・衛生部 (Department of Animal Production and Health)

S.S.C. Ranawana　　Director

政府家畜病院 (Government Veterinary Hospital

Nilapitiya A.Y. Wasantha Kumara　　Veterinary Surgeon（平成６年度帰国研修員）

獣医学研究所 (Veterinary Research Institute)

Hemal Kothalawala　　Veterinary Research Officer （平成９年度帰国研修員）

ペラデニヤ大学獣医・畜産学部 (Faculty of Veterinary Medicine and Animal Science, University of Peradeniya)

S. Mahaligan　　Dean

パンナラ獣医検査センター／パンナラ畜産事務所 (Veterinary Investigation Centre, Pannala / Veterinary Office, Pannala)

Vijitha Dharwawardhaua　　Veterinary Investigation Officer

ニューバーナーズ飼料・商業養鶏場 (New Berards Animal Feeds and Commercial Poultry Farms)

W.L.J. Perera　　Managing Director

ヴェヘナ家禽精肉所 (Veehena Farms)

N.C. Victor　　Owner

マキシハウス（Maxie House (PVT) LTD.; 家禽精肉所）

Desmond Perera　　General Manager

保健省 (Ministry of Health)

S. Nagiah　　Food and Drugs Inspector

III. 獣医学・食品衛生分野の国別状況

1. 基本的データ

(ネパール)

ネパール概況

①正式国名	(和文) ネパール王国 (英文) Kingdom of Nepal
②建国年月日	1769年 (全国統一)
③政　　体	立憲君主制
④元首の名称	ビレンドラ・ビル・ビクラム・シャー・デーブ国王 (1972年即位)
⑤位置・面積	北緯26度15分～30度30分　東経80度15分～88度15分 １４１千平方キロメートル　(注１)
⑥首　　都	カトマンズ
⑦総 人 口	21.5百万人 (1995年)　(注１)
⑧民 族 等	リンブー、ライ、タマン、ネワール、マガール、タカリ等
⑨公 用 語	ネパール語
⑩宗　　教	ヒンズー教90%、仏教５%、イスラム教３%
⑪暦	(日本との時差)　－３時間15分 (祝祭日) (1998年)　(注２) １月11日　国家統一記念日 １月29日　殉教者記念日 ２月19日　民主化記念日 ２月25日　Shivaratri ３月８日　女性の日 ３月13日　Holi festival ４月５日　Lord Ram誕生日 ４月　新年 ５月　ブッダ誕生日 ９月　Indra Jatra ９月／10月　Dasain (１週間) 10月／11月　Deepawali (３日間) 11月７日　Queen Aishworya's Birthday 11月８日　憲法記念日 12月29日　国王誕生日

出所　(注１) World Development Report　1997　The World Bank
　　(注２) The Europa World Yearbook　1997　Europa Publications

経済指標【ネパール】

1) 主要経済指標の推移	年	(1993)	(1994)	(1995)
	G D P (百万ルピー) (注1)	171,386	199,416	N.A.
	一人当たりGNP (ドル) (注2)	190	200	200
	実質GDP成長率 (%) (注1)	3.3	7.3	N.A.
	消費者物価上昇率 (%) (注1)	7.5	8.3	7.6
	失 業 率 (%) (注3)	記載なし		
	貿易収支 (百万ドル)	-461.6	-790.3	N.A.
	輸出額(fob)	397.0	368.7	N.A.
	輸入額(fob) (注1)	858.6	1,158.9	N.A.
	主要輸出入相手国 (注4)	輸出 (1994/95 年)		ドイツ(36.6%)
		輸入 (1994/95 年)		インド(31.7%)
	経常収支 (百万ドル) (注1)	-222.5	-351.9	N.A.
	対外債務残高 (百万ドル) (注5)	2,004	2,320	2,398
	債務返済比率 (%) (注5)	9.2	7.7	7.8
	外貨準備高 (百万ドル) (注2)	518	752	646
2) 通貨 (1997年 9月30日) (注6)	通貨単位：ネパール・ルピー (NRs) 1ドル = 56.95NRs			
3) 会計年度	7月16日～7月15日			

出所 (注1) International Financial Statistics Yearbook 1996 IMF
(注2) World Development Report 1995-1997 The World Bank
(注3) Year Book of Labour Statistics 1996 1996 ILO
(注4) Country Profile:India, Nepal 1996-97 1996 EIU
(注5) Global Development Finance 1997 1997 The World Bank
(注6)「各通貨の為替相場一覧表」1997 東京三菱銀行

(スリ・ランカ)

スリ・ランカ概況

①正式国名	(和文) スリ・ランカ民主社会主義共和国 (英文) Democratic Socialist Republic of Sri Lanka
②独立年月日 旧宗主国	1948年2月4日 英国
③政体	共和制
④元首の名称	チャンドリカ・バンダラナイケ・クマラトゥンガ大統領 (Chandrika Bandaranaike Kumaratunga) (1994年11月就任、任期6年)
⑤位置・面積	北緯 5.5度～ 9.5度　東経79.8度～81.5度 66千平方キロメートル
⑥首都	スリ・ジャヤワルダナプラ・コッテ*
⑦総人口	18.1百万人 (1995年)　(注1)
⑧民族等	シンハラ人 (74.0%)、スリ・ランカ・タミル人 (12.6%)、 インド・タミル人(5.5%)、スリ・ランカ・ムーア人(7.1%)、 バーガー (0.4%)、マレイ人 (0.4%)　(注2)
⑨公用語	シンハラ語
⑩宗教	仏教 (70%)、ヒンズー教 (15%)、イスラム教 (7%) キリスト教 (8%)
⑪暦	<日本との時差>　-3.5 時間 <祝祭日> (1998年)　(注3) 1月1日　新年 *1月30日　ラマダン祭 2月4日　独立記念日 (50周年記念日) *4月8日　ハッジ祭 *4月10日　聖金曜日 *4月13日　イースター・マンデー 5月1日　メーデー 5月22日　国民英雄日 6月30日　バンク・ホリデー *7月7日　マホメッド誕生祭 12月25日　クリスマス 12月26日　クリスマスの贈り物の日 12月31日　バンク・ホリデー この他、毎月満月の日は休日

(注) * : Sri Jayawardenepura Kotte. 1985年1月に首都として告示された。
旧首都コロンボの東方11キロメートルに位置する。

出所 (注1) World Development Report 1997 The World Bank
(注2) Country Profile:Sri Lanka 1996-97 1996 EIU
(注3) The Europa World Yearbook 1997 Europa Publications

経済指標〔スリ・ランカ〕

1) 主要経済指標の推移	年	(1993)	(1994)	(1995)
	G D P (百万ルピー) (注1)	499,760	578,795	661,902
	一人当たりGNP (ドル) (注2)	600	640	700
	実質GDP成長率 (%) (注4)	6.9	5.6	5.5
	消費者物価上昇率 (%) (注1)	11.7	8.4	7.7
	失 業 率*1 (%) (注3)	14.7	13.6	12.5
	貿易収支 (百万ドル)	-742.1	-870.7	N.A.
	輸出額(fob)	2,785.7	3,201.8	N.A.
	輸入額(fob) (注1)	3,527.8	4,072.5	N.A.
	主要輸出入相手国 (注4)	輸出 (1996年)	米国 (34.0%)	
		輸入 (1996年)	インド (10.4%)	
	経常収支 (百万ドル) (注1)	-382.2	-546.0	N.A.
	対外債務残高 (百万ドル) (注5)	6,854	7,891	8,230
	債務返済比率 (%) (注5)	9.5	8.3	7.0
	外貨準備高 (百万ドル) (注2)	1,656	1,686	2,038
2) 通貨 (1997年 9月30日) (注6)	通貨単位：スリ・ランカ・ルピー (SL Rsまたは SL Re) 1ドル = 59.6450SLRs			
3) 会計年度	1月1日～12月31日			

注) *1：北部州と東部州を除く。10歳以上。毎年第1四半期の数値。

出所 (注1) International Financial Statistics Yearbook 1996 IMF
(注2) World Development Report 1995-1997 The World Bank
(注3) Year Book of Labour Statistics 1996 1996 ILO
(注4) Country Report:Sri Lanka 3rd quarter 1997 EIU
(注5) Global Development Finance 1996 1996 The World Bank
(注6)「各通貨の為替相場一覧表」 1997 東京三菱銀行

2．獣医学・食品衛生学の現状

（ネパール）

概況

ネパールは人口約2,100万人でヒマラヤ山脈の南側に位置し、北海道の約2倍の面積をもつ内陸国である。1990年の民主化・市場経済への移行以降社会・経済情勢が激動し、現在に至っている。GDPの成長率は1990-1998年には2.9-7.9％と著しいが、産業構造は農業に大きく依存し、脆弱である。人口の80％が農民で、畜産の生産高はGDPの15％を占めている。1997年の人口増加率も2.3％と、多くの発展途上国同様の課題を内包している。本調査団と関連する課題のひとつが、食糧問題であり、もうひとつは高い乳幼児死亡率等劣悪な保健衛生環境問題である。

政府は、1997年に第9次5ヵ年計画を策定するにあたり、長期視野にたった計画をめざした。貧困対策、教育ならび保健医療の改善については、数値目標を設置した。農業分野では、1995年より20年間を見据えた「農業長期開発計画；agriculture perspective plan（APP）」を策定した。具体的に、①高収益畜産としての養鶏の促進、②獣医師養成教育機関の設置、③食用動物の安全性確保を目的とする「と畜および食肉衛生法」の新規制定など21世紀ネパールの社会構造の改善に係わる重要な動きがみられる。

獣医畜産学

ネパールには、牛７百万頭、水牛３百万頭、山羊６百万頭、羊90万頭、鶏1400万羽が飼育されている（1994/95）。同国では、ヒンズーを主とする宗教的ならびに歴史民族的背景、食慣習、あるいは経済情勢などが絡み合って食肉の消費は極端に少ない。しかし、水牛と山羊は食肉として利用されている。また、鶏肉は都市を中心に消費が増加の傾向にある。

同国は養鶏業の発展に期待している。鶏肉消費量は、1991年から1996年にかけて倍増した。1996年の19,656トンを、2001年には37,657トンへ増加することを見込んでいる。鶏卵についても、1996年の2億9千万個から2001年の5億9千4百万個への増加を期待している（フォローアップ対象研修生Vijay C. Jha氏のカントリーレポートより）。そのためには、現在養鶏はいわゆる庭先小規模経営であるが、今後は大規模経営の要素も取り入れられねばならない。経営形態については、先進国でみられるような効率化の追求だけでいいのかどうかも含めて、今後、あらゆる角度からの検討が必要である。

ネパールの獣医師数は現在約300名である。全員が獣医師会（会長Dr.P.Sapkota、農務省畜産局局長；本調査団は同博士と11月11日に面談した）に所属している。主業務は産業動物疾病の予防と治療で、ほぼ全員がこれにあたっている。

ネパールには獣医師養成教育機関が１校、Ranpur,ChitawanにあるTribbuwan大学に設置されている（学部長D.D. Dhakal博士と11月12日に面談）。同校農獣医畜産学部は1996年からスタートしたところで、未だ卒業生は出していない。したがって、現在の獣医師は全員外国で教育を受けた。対象国は、インドが最多でパキスタン、欧州、米国、ソ連その他となっている。

Tribbuwan大学農獣医畜産学部は、教育年限5年＋現場でのインターン６箇月である。学部教育は問題がないが、博士号を取得している教員が少なく、大学院教育は現状では困難である。修士課程は設置している。スタッフの養成を急いでいるが、その間海外からの援助を期待しているのが現状である。

施設、設備、機器についても十分とはいえない。微生物関係の施設はデンマークの援助で建設中とのことであったが、ソフトならびに運営に携わる研究者の手当てができてないのが実状である。ただし、広大な土地に水牛用の立派な飼育棟も備わっており、研究・教育環境は良好である。現在、世界中で獣医学教育の標準化が進行している。同校がグローバル・スタンダードをクリアーするにはハード・ソフト両面の強化・充実に相当な努力が必要と見受けられた。

既述のように、ネパールの獣医師のほぼ全員が産業動物疾病の予防と治療に従事している。ネパールの獣医師は、食品衛生、環境衛生、伴侶動物の診療といった日本や欧米の相当数の獣医師が担っている業務は担当していない。人畜共通感染症についても主担者として寄与している様子はみえない。

以上のように、ネパールの獣医業務は内容的に日本や欧米のそれとは異なる。獣医師・獣医界は、産業動物としての家畜の疾病診断・治療・予防、品種改良、飼養改善等をつうじて畜産業の高度化を推しすすめ、食糧増産と国民の所得向上に直接的に貢献することを任務としている。

食品衛生学

近年、世界的に食用動物由来の食中毒が多発し、食品の衛生管理の強化充実が指向されている中にあって、現在ネパールには法のもとでのと畜検査制度ならびに食鳥検査制度はない。水牛、山羊、鶏のと殺・解体は、山間、庭先、あるいは川原で小規模に実施され、これらが市場を経て消費者にわたっている。その間、制度的な衛生管理はなされていない。高級ホテルで消費する肉類は輸入品に頼っているのが現状である。水道水についても、生水は飲めない。なお、牛のと殺は法律で禁止されている。

ところで、最近大変革がもたらされた。すなわち、1998年新規に「と畜および食肉衛生法（Animal Slaughterhouse and Meat Inspection Act, 2054）」が同国議会で承認された。今後、国王の承認（サインと表現していた）手続きを経て同法が施行される予定である。近く、鶏肉を含む食用動物肉の取り扱いは法のもとでの衛生管理下におかれることになる。なお、牛（cow and ox）は、依然肉食用から除かれている。

本件は、ネパールの獣医療にとって次のような大変革をもたらし、多くの課題を抱え込むことになる（Dr.P.Sapkota、農務省畜産局局長他）。① 全国に近代的なと畜場を設しなければならない。全国に最低20箇所は必要である。そのハード・ソフトについてのノウハウは蓄積されていない。② ネパールの獣医師がはじめて食品衛生を担うことになる。現在獣医師の総数は300名であるが、それに見合った相当数の増員が必要である。③ 獣医師への食品衛生専門教育問題。④ 従事者の養成問題。⑤ 流通・販売等関連業界の育成。⑥ 生産者から国民までへの広報と協力要請による円滑な運営を図ること、などである。国際的な人と物の交流が増大する時代に、食品衛生もグローバル・スタンダードに合致しないと思わぬ不幸を市民にもたらすことになる。逆に、食品衛生の向上は国外からの観光客の増加をもたらし、ネパールのGDP増加に貢献できる。そのためには、食品衛生に係わる学術向上、人材の育成およびインフラストラクチュアーの整備が欠かせない。

（スリランカ）

概況

スリランカは人口約1,760万人の大陸から約30kmのインド洋上に浮かぶ島国である。面積は北海道よりやや狭い。人口の約7割が仏教徒で、約15%がヒンズー教徒である。気候も暑いながらも温暖で雨量も十分、人々も温和であるが、ヒンズー教徒が多くすむ北部地方で分離独立を求めるタミールゲリラが活動をしている。ゲリラ対策は同国の負担となってきたが、現在沈静化の方向に向かっているという。

獣医畜産関係では、収益の向上を指向している。その手段として、養鶏産業に注目している。できれば輸出産業に育て上げたい意向もある。獣医学の研究・教育は50年以上の伝統があるが、大学院レベルの人材育成は英国等欧州ならびに米国に依存している。自国での水準の向上も望んでいるが、大学院教育・研究者育成を日本に期待している向きがある。水を含む食品衛生については、まさに発展途上にある。

今回の調査の印象では、スリランカは、畜産、教育・研究、食品衛生のいずれの分野も21世紀を見据えて、レベルアップを指向している。しかし、自力では、それを支える人材の育成ならびにインフラストラクチュアーの整備にはかなりの財源とある程度の期間を要すであろう。

獣医畜産学

スリランカの食用動物飼育数は、牛178万頭、水牛90万頭、山羊50万頭、羊3万頭、豚90万頭、ブロイラー3850万羽、採卵鶏330万羽である。鶏肉4万2千トン、鶏卵8億5千6百万個を生産した（1996年；平成10年度研修生L.N.A.Gamage氏のカントリーレポートより）。多くの発展途上国同様、スリランカの小規模農家は家畜・家禽を飼養し、自家消費とともに現金収入を得ている。同国では最近、養鶏産業の増加率が著しい。それを支えているのは大規模私企業で、数企業だけで総生産量の80%以上を占めている。一方、農家の多くは庭先で、数羽かせいぜい数10羽を飼育している。

今回、スリランカ養鶏産業の実状を把握する目的で飼料工場、採卵鶏農場1箇所、鶏肉処理場2箇所を往訪した。そのいずれも日本の小～中規模の養鶏場に相当する。しかし、スリランカにとっては企業的養鶏へ向けた新しい挑戦である。1鶏肉処理施設は米国農務省の半額補助で建設され、米国様式をスリランカに合わせて設計されていた。すなわち、機械と人力を組み合わせた、スリランカ仕様であった。鶏肉は都市を中心に消費が増加の傾向にある。1鶏肉処理場の製品は冷蔵または冷凍され、都市市場、ホテル、それに軍へ出荷していた。その場合、品質の均一化が要求され、衛生的な取り扱いも重要な要素になりつつある。また、製品を東南アジアへ輸出する途を模索しているとのことであった。農業のなかで、養鶏産業が効率的に経営することによって比較的容易に高収入を得る魅力に富んでいると、スリランカでも認識されている。

効率化のために規模拡大をすすめると現在の小規模養鶏との間で二極化による格差問題が生じ、結果として農村構造の変革をもたらすという問題が残る。家畜衛生の面では、高温多湿の気候条件により家畜疾病の発生が多い。また、高齢牛も多く、日本や欧米諸国とは異なった疾病のパターンをとる。鶏ニューカッスル病、豚コレラ、ダニや牛肝蛭や鶏コクシジウムなど内部外部寄生虫感染、芽胞細菌による感染症などが目立つ。また、飼養形態の拡大や効率化がもたらすマレック病、肺炎や下痢、乳房炎なども経済的被害を与えている。

スリランカの獣医師数は現在約1000名である。大部分は獣医業に従事している。約1/3は公務員である。と畜検査を除いて食品衛生分野には従事していない。

スリランカの獣医学教育・主要研究機関はPeradeniyaに集中している。今回の調査で全機関を往訪し、スタッフと話し合いをもった。Peradeniya大学獣医学部がスリランカ唯一の獣医師養成機関である。1学年の定員は35～40名で、4年間の専門教育プラス1年間の実習を受ける。獣医師に必要な基礎教育（pre veteinary education）は入学前に終了している。卒業すると獣医師会に登録し、登録番号を取得して獣医業に就く。

同校は1948年創立で50年の歴史をもつ。修士課程を有するが、現在、将来計画を策定中である。博士レベルの教育は海外に依存している。以前は英国が中心であった。現在は大阪府立大学大学院に3名が学んでおり、その他米国でも学んでいる。帯広畜産大学とも学術交流協定を結んでおり、同校から1名の学生が留学し学んでいる。日本との学術交流を強く望んでいる。

中央の研究機関は、大学付属家畜教育病院（第1期の研修生で本年3月に博士の学位を得たSaman Kumara Withanage博士ならびに現本学留学生Ramani Piyankarage氏在籍休職中）、獣医科病院（帰国研修生Wasantha Kumara氏在籍）、獣医学研究所（帰国研修生G.. Vijitha氏在籍）の3箇所がPeradeniyaに近接して設置されている。獣医科病院は歴史も古く、診療業務に実績がある。獣医学研究所はスタッフの数も多く、ワクチンの製造・検査など研究業務面でもっとも充実している。日本の援助による相当数の実験機器等が配置されていた。付属家畜教育病院は、学生の教育にも利用される施設である。

地方には家畜保健所が設置され、生産農家の衛生指導に当たり、学術・情報は中央の機関と連絡している。帰国研修生のHemal Kotialawala氏は養鶏が発展しつつあるUdubaddawa地方の家畜保健所の所長として勤務している。研修の技術が生かされていた。同氏の紹介でNew Bernards Animal Feeds飼料会社、採卵養鶏場、ならびに食鶏処理場を訪問した。スリランカにおける獣医学領域の研究内容の詳細は不明であるが、今回往訪した研究施設・研究室の状況から判断して、最高度レベルには今一歩であると推察された。

Peradeniyaには獣医学だけでなく、日本の援助で設置された農学研究所、歯科大学など生物研究機関が集積している。生物学には共通する基礎的知識・技術が存在し、立地条件に恵まれている条件を踏まえてみると、各機関が交流し、学術の共有・協力を図かれば研究の効率化が期待できるのではないかと考えれれる。

食品衛生学

規模の大きなと畜場はコロンボとキャンディに各1箇所設置されている。一部食鳥処理場も含まれる。と畜検査は法律に基づいてなされ、獣医師が担っている。しかし、獣医師の検査官の数は少なく、検査助手が獣医師の仕事を助けている（留学生Ramani Piyankarage氏談）。地方での食鳥検査は十分には行われていない。本調査で往訪したMaxie House社等2社では食鳥検査官は見かけなかった。法として決められたシステムではなく、施設側の自主検査で済ましているものと推察された。

先進国では動物性食品以外の一般食品についても、その衛生管理には獣医師が中心になってシステム化されている。一般食品の衛生管理についての情報を得るために、今回コロンボの保健省輸入食品食品検査部長S.Nagiah氏の事務所を往訪した。スリランカの一般食品の衛生検査は、必ずしも獣医師ではなく、厚生省が教育した食品検査官が担当している。食品の品質保証は、食品法（Food Act No.20 of 1991改定）に基づいてなされている。S.Nagiah氏の机上に市販ボトル水がおいてあったので尋ねたら、コロンボの水道水は（危険で）生では飲めないと返答された。

以上、総合的にみて、スリランカの食品・飲料水の衛生管理は欧米諸国や日本の水準には達していないと判断される。

IV. 訪問先における具体的状況

1. ネパール

a. 援助窓口機関：一般行政省 (Ministry of General Administration: MGA)

公務員の人事を司る役所（日本の人事院に相当）。1998年7月のCivil Service Act改正により、国家計画委員会 (National Planning Commission: NPC) から援助窓口業務を受け継いだ。ただし要望調査については引き続きNPCが中心的役割を果たす。

同省によると、研修員は帰国後6ヶ月は研修内容の活用できる職場での勤務が義務付けられている。また、研修効果の事後評価はMGAでは行われておらず、研修員派遣元の各省庁にて実施されている。

同省としても農業長期開発計画（Agricultural Perspective Plan: APP) のもと、畜産分野は重視している。一方で本コースの類似案件は特に実施されていないとのこと。

b. 帰国研修員

Govinda Thakur（平成5年度研修生）

現在はインドへ留学中（大学院修士課程在学中）である。Dr. P. Sapkota (Director General, Department of Livestock Services) は、「帰国後は彼の能力を最大限に生かせるポストに着かせる予定である」とのことであった。

Parsu Ramldr Bhusal（平成6年度研修生）

研修前は、山岳地帯のDistrict Agriculture Officeにいて家禽と無関係な業務に携わっていたが、研修後はネパールの3大養鶏地帯の一つであるChitowan（他はKathmandu およびPhkhara）のDistrict Veterinary Hospitalに赴任した。この地域は平坦であるため最近は酪農および養鶏産業の発達が著しい。

Dr.Bhusalの業務は、管理業務、地区獣医師およびスタッフの教育、持ち込まれる鶏・牛の病気の診断・予防・治療、農場への訪問および相談など家畜・家禽の衛生の全てを受け持っている。

家畜・家禽の病気の発生報告は、地区獣医師や直接農夫から、もしくはoff-timeに臨床をしている公務員獣医師から知らせられる。疾病の診断は伝染の模様、臨床症状、および病理解剖による肉眼所見により行われる。確定診断は検査材料をKathmanduにあるAnimal Health Diagnosis (Animal Health Research Division, Nepal Agricultural Research Council) に送り、その結果をみて行われている。これはDistrict Veterinary Hospitalが現場であるので検査体制が貧弱なためと思われる。

Bhatt Diker Dev（平成7年度研修生）

SalayanのDistrict Livestock Service Officeに勤務し、山間部の家畜全般の防疫にあたっている。家禽も少々含まれるが、牛、山羊、羊の疾病の予防・治療および農場への訪問および相談などが主業務である。研修で習得した技術は施設・設備が不備のままであるため十分に診療業務に反映されていない。

Vijay Chandra Jha（平成9年度研修生）

Kathmandu市内にあるNepal Agricultural Research Council (Animal Health Research Division) に勤務し、牛、水牛、羊、山羊の細菌性およびウイルス性疾患を中心とした疾病の予防・診断に関係する研究を行っている。研修時、細菌の培養および血清診断を習得し、現在それを実行している。高取専門家が研究室に指導に来られてから、ウイルスの組織培養の手法を教えられ、最近その技術を習得しウイルスの培養が可能になった。

鶏のガンボロ病の流行対策として、Holland, U.K., India, U.S.A. からワクチンを輸入し用

いているが、その効果が芳ばしくなく発生が勃発している。輸入時のワクチンの効力、ワクチンの保存と配布、養鶏場でのワクチンの投与方法の何れかに問題があると想定され、解明するためのプロジェクトを提案している。施設や器具の貧弱さ、研究所員や補助職員の労働意欲の低さ、月収の低さを補填するための夕方5時以降のoff-timeの労働など、問題の多い点を指摘していた。

c. 研究所等訪問先

◇National FMD (Foot and Mouth disease) Control Section, Chapali, Budhanilkantha, Nepal (Dr. G. N. Gongal)

ネパールにおけるFMD controlのセンターであり、発生状況を把握している。診断のためFMDの4ツの血清型はインドのそれと同じである。それは、インドとの国境を介して人もモノも往来が自由であるため、病気も同じものが蔓延する。水牛や野生動物に感染が常在するため防圧が至難である。また、チベットおよびバングラデイッシュからも感染動物が出入りする。それでも、地区毎のウイルスの型をくまなく確定していき、それに対応するワクチンを用いて、波状的に防衛線を広げる計画を実施している。

日本からワクチンや診断血清を供給してほしいが、ワクチンが無理なら血清でも何とかしてもらえないか、との要望が出された。

◇District Veterinary Hospital, Bhatatpur, Chitowan, Nepal (Dr.Parsu Ramldr Bhusal)

施設は、事務室、診療室・検査室・薬室、剖検室の3棟、動物小屋1棟である。診療室・検査室・薬室の棟には、顕微鏡1台、遠心器1台、冷蔵庫1台のみであり、試薬や薬品の量もきわめて貧弱である。剖検室は小動物の病理解剖用である。動物小屋は屋根のみで、6頭の中大動物の収容が可能である。

ここには、Hospitalの長（獣医師）、Dr. Bhusal（獣医師）のほか2名の獣医師、7名のTechnical assistanceが居る。Chitowan District内には34名の獣医師が現場に配置されている。

◇Institute of Agricultural & Animal Science, Tribhuwan University, Rampur, Chitowan (Dr. Durga Datta Dhakal, Dean)

ネパールには獣医大学がなかったため、獣医師は近隣のインドやバングラデイッユ、または英米に留学して教育をうけていた。獣医学教育の必要性の増大から、本大学の畜産学教育に2年の教育を継ぎ足して6年制教育とし、5年半前から獣医学教育を開始した。1クラス20名であるが、1貫の獣医学教育を受けたものは未だ卒業していない。しかしながら、教員の殆どがBS degreeのみで、MSやPhD所持者は極めて少ない。PhDコースを計画しているが見通しは苦しい。本がない。JournalごとにInternational Journalが皆無である。客員教授の派遣や日本の援助を申し入れたい。ネパール政府の認めた日本への要請案（230万ドル）を日本大使館に提出した。と言うのがDeanの説明であった。

Campusを巡り獣医学教育の現場を案内された。図書館には獣医学の専門書がわずかあるのみ、2教室は埃っぽく黒板は粗悪で小さい。音響効果が悪い。家畜病院は暗く、医療施設は貧弱である。診療しても料金は薬品代のみを徴収していた。家畜病院の並びにUKの援助でMicro biologyの建物が建設中であった。畜産学が母体であるため、畜産の施設は優れていた。UK, U.S.A., The Netherlandsからの援助でできた建物があったが、要請して建築したに拘わらず使用されている状態ではなく、その理由の説明は無かった。

2. スリランカ

a. 援助窓口機関：大蔵省対外資金局 (Dpt. of External Resources, Ministry of Finance: ERD)

候補者の選考は主に各省庁で実施しているが、ERDにおいても候補者の年令、研修員内

容、過去３年間に海外渡航歴がないかにつき確認している。帰国研修員は研修内容に関連した職務に従事しており、評価レポートの提出義務がある。
家禽農家数の増加に伴いニーズが拡大、当研修コースを高く評価している。また、韓国、オランダ、日本-シンガポールも類似案件を実施しているとのこと。

b. 帰国研修員

Withanage Gamini Saman Kumara (平成5年度研修生)
現在は日本へ留学中（大阪府立大学大学院獣医学専攻博士課程在学中）である。

Nilapitiya A. Y. Wasantha Kumara (平成6年度研修生)
研修前も後も、Government Veterinary Hospital の実質的な管理および運営は、Wasantha が行っている。研修前は鶏の診断は余り自信がなかったが、研修後は積極的に鶏病診断を行 ｯており、従来の犬・猫や牛、象の診療もあるため、多忙を極めている。

Gamarallage Vijitha Kumara Senanayuake (平成7年度研修生)
現在は日本へ留学中（現在、宮崎大学獣医学科研究生、平成11年4月から大学院博士課程進 学予定）である。

Hemal Kothalawala (平成9年度研修生)
以前から、Virology のResearch Division に属している。畜産農家の直面する Virus性疾患が研究課題である。最近、家禽産業の発達とともに鶏病の問題が重要視されてき ているため、Divisionが特に取り上げているのは鶏の伝染性ファブリキウス嚢病(Infectious Burusal Disease, IBD, 別名ガンボロ病）対策である。輸入ワクチンを用い予防にあたっているが、病気の発生を抑 ｯることができないので困惑している。ワクチンの保存、運搬、接種に問題があると推定されるが、問題点ははっきりしていない。ために、週３日はその研究とフィールドの調査にあったり、２日は他の鶏病にあてている。
鶏の確定診断については、VRIはReserch-oriented であること、外部対応への迅速性という点を勘案し、自分自身が研修で習得した手法による免疫組織学的機器の導入を要求している。

c.研究所等訪問先

◇Faculty of Veterinary Medicine & Animal Science, University of Peradaniya (Dr. S. Mahaligam, Dean)　および Veterinary Teaching Hospital (VTH)
Dr. S. Mahaligamは本年５月から、前任のDr. Kuruwitaの後をうけて学部長になっている。獣医学教育は50年の歴史がある。現在 Faculty Action Committeeを設け学部教育の改善にあったている。獣医学の専門教育は４年で、毎年70名の学 生を受け入れている。スタッフは４人の教授、１名の準教授、１０名のSenior Lecturer、とProvisional Lecturerで構成されている。学位はLink Programmeをもっていたcambridge大、London大、Nebraska大、Ohio大などで獲得している。Tennessee大の大学院へ行く予定のスタッフもいる。なお、家禽分野での大学院コースの開設を予定している。
獣医学部は、現在、帯広大学とLink programをもっており学生や教員との交流を行っている。大阪府立大学と協定を結び交流する ことを希望していた。
開学以来VTH は非常に小さいクリニックでスタッフは少数であり、医学部、歯学部と同じDivisionに属していた。当初は１日24時間の診療体制をとっており、多いときには１日100例の症例があった ことのこと。７年前に獣医学部の付属の教育病院となった。現在は、勤務時間内での診療体制を とっている。６回生の臨床教育は、６カ月間のインターン制をとっており、その中心は VTH であるが、学生にグループを組ませロテーション制で、VTH, Government Veterinary Hospital およびVeterinary Research Institute を巡回して病気

の材料に接触させている。
VTHは３階ビルの１階を占めており、受け付け、診療室、手術室、臨床検査室、薬室、X線室、入院室など基本的な施設設備は備わっていた。別の棟には、小動物飼育室、大動物の係留所がみられた。したがって、外患を利用して臨床の基本教育は出来ると思われた。しかし、新しい診療機器は見られなかった。

◇Government Veterinary Hospital (GVH) (Dr. Nilapitiya A. Y. Wasantha Kumara)
今年は、GVH創立50周年の年にあたっている。ここには、3名の獣医師、２名の技術者、１名の補助者で臨床病理を担当、２名の獣医師補助、１名の用務員で構成されている。診療が業務であるため、究は行っていない。全ての動物種を受け入れている。農場から直接くるもの、獣医師の紹介でくるもの、大学のVTHから紹介されてくるもの、Veterinary Research Institute（VRI）からくるもの、などがある。また、逆にGVHからVTHやVRIへ紹介する場合もある。家畜の診療費は無料にしており、犬・猫のペットは診療料金を請求し、象の診療（約10Kmの距離のとことにある象診療所）には１頭200ルピー請求している。死んだ動物の剖検をすることもあるが、VRIに鑑定をお願いすることもある。鶏の肉眼による剖検鑑定はここで行うが、微生物鑑定はVRIに、また病理組織学的鑑定は大学の病理部門にお願いしている。
VTHよりはやや優れた設備を備えていた。動物の診療を１手に引受けてきた50年の歴史と重みが感じられた。

◇Veterinary Research Institute (VRI) (Hemal Kothalawala)
この施設はスリランカ国の家畜・家禽の疾病を防圧するための試験研究機関で中心的存在である。かっては家畜・家禽の主な伝染病のワクチン製造していたが、特定の病原体を持たないフ化鶏卵が入手できないため、現在は製造していない。外部から持ち込まれる中・小動物の病理解剖室があり、家禽の解剖が行われていた。肉眼および顕微鏡観察による疾病の診断は行われている。細菌およびウイルスの培養および同定に必要な設備は不十分で、日本を含め外国からの援助器材が設置されていた。しかし、研究活動は活発には行われていないように見受けられた。施設は全体的に清潔さが欠けている様子であった。Poultry Services UnitとVirology divisionは最近合併されDivision of Poultry Services and Virologyとなった。なお、新たに研究所が増設される予定とのことであった。

V. 食用動物疾病の診断技術コースへのフィードバック

1. 研修に対する期待

5年間にわたって実施した「家禽疾病診断技術コース」では、主として農場レベルでの疾病診断技術の研修で、食鳥処理段階の食品衛生面の技術習得はほんの一部に過ぎなかった。1998年度から新たにスタートした「食用動物疾病の診断技術」では、牛および鶏を中心として、魚介類ならびに加工食品等食品の安全性確保技術の研修に内容を衣更えをした。

新コースの趣旨は、現在世界的に問題になっている食用動物由来の食中毒の多発に対応した衛生管理の新技術を教授することにある。これは「家禽疾病診断コース」に参加した研修生の要望にも応えるものでもあった。現在最先端の食品衛生の概念は、「農場から食卓まで」を一貫して衛生管理の対象とするものである。すなわち、健康な家畜の生産から家庭における消費者の教育までを包含した総合的な衛生対策である。そして、獣医師は世界中で食品衛生の中核を担っているのが実状である。

今回のフォローアップで、ネパールおよびスリランカ両国において、食品衛生の重要性が浮きぼりになった。両国とも、養鶏産業を高付加価値農業と位置付け、その育成強化重要施策としている。それは衛生管理が伴わないと達成できないことも認識されている。すなわち、食品衛生を担う獣医師に対する専門技術研修の緊急性が明確にされた。

ネパールでは、新たな法律の制定により、まさに食用動物の衛生管理制度がスタートしようとしている。施設・設備の整備から専門家の育成までゼロからの出発である。同時に、5年前からスタートした獣医学部の整備充実についても課題を多く抱えている。このような状況を背景に、同国関係者の「食用動物疾病の診断技術」への期待には強いものがあった。さらに、新獣医学部に対する日本からのハードならびにソフト両面での援助も望まれた。

スリランカでも、食品衛生に関しては発展途上の段階で、関係者は食品衛生分野の研究・教育の強化充実を将来計画の重点項目に挙げている。わずか2カ国の訪問であったが、発展途上国における動物性食品の衛生管理に対する必要性、重要性、ならびに緊急性は予期していたレベルを遥かに超えていた。ネパールについては前述のように、新コースの研修はまことにタイムリーであり、できるだけ多くの研修生を迎えたい。そして、将来のネパールの食肉・食鳥衛生の技術指導者になってもらえるものと確信する。

食用動物の安全性が抱えている問題は世界共通のものであり、ネパールやスリランカと同様な状況下にある国も多いものと推察される。同様に、食品衛生に関する学術も国際的の標準化されており、世界の人々が等しく享受できるべきものである。日本がもつ最善の学術を以ってその期待に応え、人類の福祉の向上に寄与するのが「食用動物疾病診断コース」の使命である。今回の調査で得た知識を基に、その研修内容に改善を加えて、より効果的な研修を実施したい。

2. 具体的提言

(1) ネパールに対する具体的施策

ネパールでは動物性食品の衛生管理システムの立ち上げ段階にあり、食品の安全性の向上に大きな効果が期待されている。関西カトマンズ間には直行便も整備されており、人と物の交流が増大しつつある。ネパールはヒマラヤという世界に誇る観光資源を有しており、その有効利用は同国の国力向上に役立つとともに世界の人々への奉仕につながる。世界から観光客を受け入れるためには食品の安全性確保に係わる基盤整備が最重要の課題となる。欧米先進国に先行して総合的技術援助を行なうことが日本の責務である。関西はその能力を有しており、これは、対費用効果にも優れたプロジェクトであると思考される。具体的に次のことを提言する。

1) ネパールの食品衛生専門家（今後5年以内に10人以上）の養成

2） 建設中のネパールTribbuwan大学農獣医畜産学部への教育・研究・技術スタッフの派遣
3） 年間５０万羽規模の食鳥処理パイロット施設の建設。利用目的は次の通りである。
①ネパールの国情にあった食鳥処理施設開発のテストプラントの役割
②Tribbuwan大学農獣医畜産学部生の教育に使用
③食品衛生技術開発用研究の拠点施設として利用
④アジア諸国の食品衛生技術者のための卒後・生涯研修施設として利用
⑤食品産業従事者の専門教育に使用
⑥安全な食鳥肉・同加工品の生産
4）Tribbuwan大学農獣医畜産学部と大阪府立大学獣医学科との学生交換
Tribbuwan大学の背後には広大な野生動物保護区がひかえている。また、動物疾病も多発している。本学には獣医学術習得に必要な施設・設備が整っている。交流により両校の長所を学生が受けることで教育効果があがる。

（2） スリランカに対する具体的施策
ネパールの場合と同様の教育・研究協力が有効である。養鶏産業育成、食鶏処理プラント建設ではスリランカに先行している。この計画をさらに推し進めるのに協力が可能である。具体的に次のことを提言する。
1） 民間の協力を得て、実用的食鳥処理プラントの建設と運営スタッフの派遣
2） Peradeniya大学獣医学部の食品衛生分野への教育・研究スタッフの派遣
3） Peradeniya大学獣医学部スタッフの招聘

（3） 現在の協力関係のさらなる推進
現在、欧米から問題が提起された獣医学教育の世界的標準化の動きが、アジアにも及んでいる。グローバル・スタンダードが21世紀には現実のものになるが、対応が一番遅れているのがアジアの獣医学教育機関である。日本でも国立大学の再編整備が図られつつある。獣医学教育の強化・充実のためには国内外を問わず大学間の協力体制の構築が避けられない。獣医学術に関しては国境がなくなりつつあるのが実情であり、大阪府立大学にあってもその観点から大局的ストラテジーを模索している。
現時点で、本学はスリランカから本学大学院へ留学生を受け入れている。本年3月には第1号の博士の学位取得者が誕生した。以前からの研究上の個人的結びつきから出発して、近々本学とPeradeniya大学との間に学術交流協定を結ぶ予定である。Tribbuwan大学農獣医畜産学部からも学術交流の打診を受けている。本学では、その実現へ向けて検討をはじめている。
同じ獣医学大学といえども、Peradeniya大学、Tribbuwan大学、本学は、それぞれ性格が異なる。本学は、牧場等獣医学教育上必要な施設が不足している。日本では多くの疾病が浄化され、症例にも事欠く状態である。その分、基礎研究、食品衛生等二次，三次産業関連獣医学分野の学術、大学院レベルの教育・研究に特徴を見出そうと努力している。本学が提供できるものとして、大学院への留学生を受け入れとスタッフの派遣、学生の交流を挙げたい。留学生の受け入れは文部省の国費によっているが、2，3年に1人といった現状では十分な効果が得られない。対費用効果の観点からも、継続可能な重点的配慮が強く望まれるところである。課題「食用動物疾病の診断技術」は、この点からも最適のプログラムであると自己評価している。今回のフォローアップ調査で得た知見の結論として、①大学院への留学生の招聘、②スタッフの派遣、③受け入れ施設の整備を、緊急かつ具体的提言としたい。

IV. 参考資料

1. ネパール Animal Slaughter and Meat Inspection Act
2. ネパール Agriculture Perspective Plan (Executive Summary と Livestock の項のみ)
3. ネパール The Epidemiology of Foot and Mouth Disease in Nepal（国家口蹄疫管理部長）
4. ネパール 援助窓口機関、研修員所属先、帰国研修員による当研修コースの評価
5. スリ・ランカ The Food No. 26 of 1980 with Inclusion of Amendments from Food (Amendment) Act No. 20 of 1991
6. スリ・ランカ 帰国研修員による当研修コースの評価
7. 団長総括の要旨
8. 帰国研修員名簿
9. 実施要領（平成9年度版からの抜粋）
10. 国別年度別研修員参加実績表

ANIMAL SLAUGHTERHOUSE AND MEAT INSPECTION ACT, 2054

Preamble:

To safeguard the health and welfare of public and to prohibit adulteration in meat and meat products, to prevent any fraud which lower the wholesomeness quality and adequacy of meat, it is imperative to establish slaughterhouse and arrangement for meat inspection.

Therefore, on the 26th year of accession of His Majesty the King Birendra Bir Bikram Shah Dev, the parliament has enacted this Act.

1. **Short title and commencement:**
   (1) This Act shall be called "Slaughterhouse and Meat Inspection Act, 2054".
   (2) This Act shall come into force in prescribed area on a prescribed date which His Majesty Government may notify it in the Nepal gazette, to specify it.
2. **Definition**: In this Act unless there is anything repugnant in the subject or context.
   (1) "Animal" means castrated or uncastrated goat, sheep, pig, wild boar, chyangra goat, buffalo, bull, rabbit or the females above which are fit for meat other than cow and ox and this word also includes poultry, ducks, pigeon or other species kept for meat purpose.
   (2) "Meat" means meat of the animals which is fit for human consumption.
   (3) "Meat inspector" means person appointed or as prescribed under Article 6.
   (4) "Meat supervisor" means person as prescribed under Article 7.
   (5) "Slaughterhouse" means house or place where animals are slaughtered for meat.
   (6) "Meat seller" means a person who sells the meat professionally.
   (7) "Prescribed or as prescribed" means prescribed or as prescribed on the regulation made under this Act.
3. **Prohibit to established slaughterhouse and selling of meat without license:** Nobody shall established slaughterhouse or selling the meat without obtaining license under this Act.

4. Established of slaughterhouse:

(1) His Majesty Government may established the slaughterhouse in any area of the country by the notification in Nepal gazette.

(2) What so ever is written in Sub-Article (1) His Majesty's Government may give permission to non-government sector as well to establish the slaughterhouse.

(3) The terms and conditions and specification to established the Slaughterhouse under Article (1) or (2) shall be as prescribed.

5. Application for license:

(1) Person interested to established a slaughterhouse or selling of meat, shall obtain license as prescribed.

(2) To obtain the license under sub-article (1) a fee is to be paid as prescribed.

6. Appointment of Meat Inspector:

(1) His Majesty's Government may nominate/appoint a person as a Meat Inspector to examine animals or meat, who is at least graduate in veterinary science.

(2) Others rights and duties of Meat Inspector will be as prescribed, in addition to mentioned in this Act.

7. Nomination of Meat Supervisor:

(1) His Majesty's Government may nominate a Meat Supervisor to any Civil servant who is at least graduate in veterinary science for supervision of slaughterhouse management and as Meat Supervisor.

(2) His Majesty's government may nominate the Meat Supervisor as Meat Inspector in case if there is no Meat Inspector.

(3) Other functions, duties and rights of Meat Supervisor shall be as prescribed.

8. Inspection of animals before slaughtering (Anti-Mortem Inspection):

(1) Animal to be Slaughtered should be produced for inspection and anti-mortem examination before meat supervisor, at slaughterhouse, and in the area where slaughterhouse is not yet constructed such animal should be inspected at the site prescribed by the Meat Supervisor. Procedure for examination of animal will be as prescribed.

(2) After inspection under sub-article (1) animal found suitable for slaughter may be permitted for Slaughter with marking the animal by Meat Inspector.

(3) Upon inspection under sub-article (1) if animal is found diseased, such animal should be prohibited for slaughter.

9. Slaughtering of animal in slaughterhouse:

(1) Animal fit for slaughtering under article (8) shall be slaughtered in the slaughterhouse.

(2) Whatever is written in sub-article (1) if there is no slaughterhouse in those area, animal shall be slaughter at the place and time as prescribed by the meat supervisor.

10. Meat examination of slaughtered animal:

(1) Meat inspector should inspect the meat of the slaughtered animal under Article 9, as prescribed.

(2) If meat inspector find any disease in meat of slaughtered animal upon inspection under sub-article (1) such meat may be prohibited for selling partially or completely by Meat Inspector.

11. Prohibition on sale of carcass:

(1) Sale of meat of animal other than mentioned in section (A) of Article 2 shall not be allowed.

(2) Meat of dead animal due to disease or any other cause shall no be allowed for sale.

(3) Sale of meat with skin shall not be allowed.

But this article shall not be applied for selling the meat of birds, pigs, wild pigs and in other species identifying organs or portions like head and legs with skins.

12. Marking or stamping on carcass:

(1) Meat inspector shall affix clearly visible marking or stamp as prescribed during the certification of meat for sale.

(2) No meat shall be sold without the marks or stamps retired under sub-article (1).

13. Adulterated meat shall not allowed to sale:

(1) Adulteration of carcass with another species of animal or deceiving the species of animal while selling meat shall not be allowed.

(2) Adulteration of meat with any substance that alters the normal quality or taste or weight shall not be permitted for sale.

14. Fee to be paid: Inspection of animal or meat under this Act, fee shall be levied as prescribed.

15. Authority to enter: Meat Inspector or Meat Supervisor may enter in slaughterhouse or butcher's shop and may take sample of meat or inspection of animal or carcass. To help on this work will be the duty of all concerned.

16. No objection: Whatever contain in this Act, there will be no objection on slaughter of animal for household purposes the relevant Articles of this Act shall not be effective.

17. Penalty and punishment:

(1) Person who contrivance sub-article (1) or (3) of Article 8, Article 9, sub-article (2) of Article 10, sub-article (3) of Article 11 or sub-article (2) of Article 12 shall be punished with a fine of maximum of Rupees one thousand.

(2) Person who contrivance Article 3, sub-article (1) or (2) of Article 11 or Article 13 shall be punished with a maximum fine of Rupees Five hundred.

18. Delegation of authority: Authority vested on His Majesty's Government under this Act may be delegated with limit to other bodies as required.

19. His Majesty's Government shall be plaintiff: His Majesty's Government shall be plaintiff on case under this Act.

20. Investigation of crime and defence:

(1) Meat Inspector shall investigate the case under this Act and register the case after completing the investigation he shall file the case to judiciary powered officer.

(2) During the registration of the case under sub-article (1) investigation personnel may take advise with government lawyer.

21. Judicial authority: The judicial authority for cases and hearing appeal related to this Act should be vested on prescribed officer.

22. Shall be according to the prevailing law: Whatever mentioned in this Act shall be decided accordingly, while in other matter it will be as per the prevailing law.

23. Authority to frame rules: For the implementation of purpose of this Act. His Majesty's Government shall have authority to make the necessary rules.

24. Repeal: Whatever is written in Muluki Ain (Act) under Chaupaya (Four footed animal) on paragraph number 3 and 16 has been repealed.

Agriculture Perspective Plan

EXECUTIVE SUMMARY

AS THE YEAR 2000 DRAWS CLOSER, the people of Nepal stand poised to enter the new century on a track of prosperity. They now have the resources to experience the same greatly accelerated growth enjoyed in many parts of East, Southeast, and South Asia. Past decades have provided an increasingly educated public, a multiplicity of complex institutions, and a substantial physical infrastructure. The time has come to convert that past development into rising living standards for all through dynamic growth. The Agriculture Perspective Plan (APP) is designed to do just that.

The engine of growth will be agriculture. It dominates employment through its direct and indirect influences, is the largest component of Nepal's gross national product, has great potential for technology-based increases in resource productivity, and has strong multiplier effects on other sectors of the economy. Thus the APP will accelerate Nepal's agricultural growth rate by 2 percentage points: from about 3 percent per annum to 5 percent per annum. Combined with a decline in the population growth rate, from 2.5 percent to 2.0 percent, this represents a sixfold increase in the growth of agricultural output per capita: from the current insignificant rate of 0.5 percent to a rapid 3 percent.

With this sharp acceleration, farm incomes will rise rapidly. Farmers will then have the purchasing power to boost the demand for high-value agricultural commodities—particularly milk, vegetables, and fruits—and for nonagricultural goods and services from the small and medium-scale enterprises of villages and market towns. Since these activities are employment intensive, they will drastically reduce poverty in Nepal.

Over the course of the twenty-year Agriculture Perspective Plan, the rural poor will decline by 5.5 million and the proportion of the rural population in poverty will be only one-quarter that at present. Ecologically fragile lands will revert to forestry and an increased area will be planted to soil-conserving tree fruits and to fodder crops, including fodder trees and legumes. As nonagricultural employment then gathers momentum, it will be diffused throughout the nation's market towns, thus slowing the growth rate of Kathmandu, with salutary environmental effects. In addition, the immense growth planned for the livestock sector offers unusually large potential for increased incomes to women.

The APP states the conditions not only of accelerated growth in agriculture but also of employment growth, which is the key to reducing poverty in Nepal. It also states explicitly the ancillary policies through which the APP growth strategy can enhance the environment and circumvent potential environmental hazards in the plan. Moreover, the proposed pattern of growth helps women increase their earnings, and addresses their special problems as they attempt to participate in accelerated growth.

Equally important, the APP is regionally balanced. Whereas the terai currently dominates rural growth, under the plan, growth will be slightly faster in the hills and mountains and will bring these two regions a proportionate share in the benefits of growth. The synergism between the terai and the hills and mountains is to be realized through specific priority investments and production packages.

Despite the failure of previous policies favorable to agriculture, the APP is expected to succeed because it charts a known course. Government action is to be focused on a few priorities that recent experience in Nepal and in countries with sharply accelerated agricultural growth rates has shown to be critical to success. Furthermore, it combines those few priorities into an integrated package; provides the implementing institutions with analytical and follow-up capacity at the district and national levels, removes the impediments that bar the private sector from investing in growth, and provides positive assistance for such investment. The timing of the APP is right: it is able to draw on past efforts in Nepal that are now proven and ready for large-scale application.

WHY AGRICULTURE ?

It should be self evident why agriculture must be central to accelerated growth in Nepal, and particularly to participation of the mass of people. Ninety percent of Nepal's people live in rural areas. More than a quarter million jobs must be provided each year simply to keep up with labor force growth, let alone to provide more productive employment to those currently in absolute poverty. Kathmandu is bursting at the seams. The dominant export led non-agricultural sectors are garments and carpets. They jointly occupy a total of less than 100,000 people. It would take two-and-a-half of these added each year to absorb the labor force growth—and at a time when there is immense concern about the environmental impact of the existing size of these industries. The bulk of non-agricultural employment in Nepal is related to agriculture, either through production or consumption activities. The APP by mid-term generates enough employment directly in agriculture, and more important through its multipliers to rural non-farm employment to more than absorb the labor force increments, thus allowing for increased labor productivity and hence rising wage rates. Only agriculture has the current size and multipliers to provide this result. In any case, what Nepal's growth rate and poverty picture looks like with stagnant agriculture has been staring us in the face for the last few decades. A recent book (Mellor, 1995) shows for six major agricultural success stories (Taiwan, Thailand, Punjab, Kenya, Costa Rica and Columbia) how agriculture plays this key role in the take off into transformation of the economic structure. It also provides a case (the Philippines) of agriculture growing rapidly and not stimulating non-agricultural growth—a lesson taken into account explicitly in the APP; and it shows how a country (Argentina) with excellent agricultural resources can fail to utilize that resource, with disastrous consequences for the rest of the economy.

STRATEGY FOR GROWTH

The strategy can be seen as having 7 components. First, accelerating agricultural growth. Second, doing so through large, concentrated investment in a small number of input priorities. Third, those input priorities are shallow tubewell irrigation in the terai, agricultural roads, fertilizer, and the technology system of research and extension. Fourth, a small number of high- value commodity priorities to facilitate intensification of agriculture, especially in the hills. Fifth, those priorities are citrus, vegetables and vegetable seeds, apples, apiculture and sericulture. Sixth, strong multipliers from increased farm incomes to growth of output and employment in the rural non-farm sector, as the principal means of solving the problems of employment, poverty, environment, and dispersal of urbanization. Seventh, an implementation mechanism that operates at the district and national levels, and is complemented with an analytical body to facilitate reinforcement and adjustment of the plan over time. The strategy requires packaging the component parts at the district, village, and farm levels. It is described as a Prioritized Productivity Package. The details of the strategy are quite different for the terai and the hills and mountains.

One auspicious aspect of the APP is its recognition of the need for a different strategy for the terai and the hills and mountains. The terai strategy is technology driven. It will take advantage of technological advances to provide well-controlled year-round irrigation to the bulk of the cultivated area and thereby enable the terai to achieve rapid catch-up growth in the basic food staples. This will be achieved through a massive push toward groundwater development, accompanied by continued rehabilitation of surface schemes managed by more and more farmers, and through policies that will accelerate the use of fertilizer, integrate all of the terai into national and global markets through the provision of a complete network of all-weather roads, and focus research and extension systems on enhancing the productivity of a few select commodities and systems with the greatest potential.

The terai has not kept pace with areas in other countries with similar resources because the years of large-scale irrigation investment have benefited only 18 percent of the area's arable land, few of the villages are on all-weather roads, the supply of fertilizer is far too little to the needs of fast growth, and the research and extension systems have failed to produce the crop varieties and practices essential to sustained high rates of growth. The APP sets out to change each of those factors. It does so by building on the substantial existing structures and by packaging the set of investments to ensure the synergism necessary for a large production impact.

In contrast, the strategy for the hills and mountains is demand driven. Rising incomes, in large degree from the terai strategy, but also from export markets, will provide the effective demand for the high-value commodities that are relatively more important in the hills and mountains than in the terai. The objective of the package approach in the hills and mountains is to increase the production of livestock products and high-value crops.

Like the terai strategy, the hills and mountains strategy aims for a system of agricultural roads that will facilitate the commercialization of agriculture, fertilizer

supplies in the quantity and time required, improved technology, and improved water control. However, the package centers on key high-value commodities and the constraints to the rapid growth of those commodities with regard to their inputs, marketing, processing, and farming systems. Therefore, rapid growth in the hills and mountains will lag a few years behind the take-off in the terai. Even under existing conditions the hills and mountains are trailing the terai by about one-quarter in growth rate. That lag will not continue for long under the APP.

The commodities at the center of the hill and mountain package are livestock (specifically milk), citrus, apples, vegetables and vegetable seed, and the products of apiculture and sericulture. The first four are dominant high-value commodities in various hills and mountains agroecological zones. Apiculture is highly complementary to fruit production and has the potential to bring low-income rural people into the participation stream. Sericulture has a particularly strong comparative advantage, despite its currently low value of output, and has special potential for the participation of women.

It must be emphasized that although the APP sets a few priorities for focused government action, it is not exclusionary, in the sense that other activities may in time also become important. The plan priorities must themselves be adjusted over time. Nevertheless, the fundamental principle is that the past diffusion of scarce public capacities over a myriad of activities cannot yield the critical mass and the quality of output essential for success. Business carried on as in the past does not work.

Although the terai strategy is not driven by a commodity orientation, in practice, rice, wheat, maize, potato, livestock, and high-quality fodder (for milk), vegetables (grown largely during different seasons from produce in the hills and mountains) and fruit (mango and banana) will continue to be important. But the first priority must be on the basic food crops that dominate Nepal's agriculture and offer unusual opportunities to increase productivity. Those priorities must be matched by complementary priorities in the technology system.

The two regional strategies are not exclusive in their thrusts. Of course, food production will increase rapidly in the hills and mountains and high-value commodities in the terai. But, the focus of the package will differ because of the different resource bases and consequent differences in the core influences on accelerated growth. The priorities for the package effort focus on what will be the initial source of rapid growth in the respective areas.

Despite their core differences, the production packages for the terai and the hills and mountains also have some features in common. Growth in agricultural incomes will stimulate the growth of output and employment in the villages and market towns. That is the poverty reduction strategy.

A grid of agricultural roads is essential not only to precipitate agricultural growth, but also to encourage populations to remain employed in the small and medium-scale firms in the villages and market towns. The roads encourage a variety of people to reside in the villages: not only the personnel needed to staff the key agricultural growth institutions but also those who can run the health and family planning clinics so critical to the improved well-being of the poor.

Another common feature of both strategies is the emphasis on well-controlled year-round water supplies. Such supplies are absolutely essential to high-intensity agriculture. In all regions, the technology system is to be oriented toward a steady flow of improved technology, which is the key to economic growth in all countries of the world. At the same time, fertilizer policy will ensure that supplies are available at the time and in the form needed by farmers intensifying their agriculture.

The fastest growth rates are in commodities in which women are particularly likely to play an important role, not only in providing labor but also in providing entrepreneurship and benefiting from the enhanced income flows. The plan gives special attention to women's access to credit, their possible influence on research, their participation in extension programs, and measures that would increase the profitability of small businesses run by women. It does so not only by specifically calling for increased women's employment in these programs, but also by stating operating procedures that will make it easier for women to fit into such programs, given their other responsibilities. The strategy must be broadly participatory if it is to have a large aggregate impact, and so women and small farmers must be included.

The plan gives the same attention to the specifics of policies concerned with environmental issues. The plan outlines specific positive programs and specific efforts designed to ensure that resource degradation and pollution do not occur. That emphasis is particularly important in the technology system and is clearly specified in the priority research on soil fertility, the role of organic matter, integrated pest management, and farming systems that provide sustainability.

The sense of priority—of doing a few things well—that drives the overall strategy applies to each of the components as well. The plan specifies four priority inputs for investment, four priority outputs for institutional support, five critical institutions, and four key areas of policy change. Each of these priorities subsumes further priorities. The plan promises success, but only if these blocks of priorities and the package approach are strictly observed.

Two other key elements of the strategy are the mechanisms for implementation. Without them, the APP will go the way of plans of the past. The prioritized productivity package (PPP) must be modified suitably and implemented at the district level. A new district level body is to play a key implementation role. A national body will also play a central role: the National Support Committee (NSC) will report to a cabinet subcommittee chaired by the prime minister and will oversee the plan and take remedial action as necessary. To ensure its effectiveness, the NSC will have an independent analytical unit to collect and analyze comparative data on the various districts, which will provide the basis for healthy competition among them and the factual basis for central oversight. With only a small number of priorities to focus on, the two implementing bodies will be able to function efficiently and effectively.

This strategy is neither alien to Nepal nor a departure from the successful strategies followed in the fast-growth economies of Asia: Taiwan, Thailand, Indonesia, Malaysia, and Punjab and Himachal Pradesh of India. It should be remembered, too, that each of these economies employed a variant of the strategy suited to the specific conditions of their own national resource base. The record of the Indian states is the most

relevant for Nepal, not only because they are closer in space and time, but because their strategies are particularly close to the APP strategy. Numerous examples of how this strategy has also succeeded on a limited scale in Nepal appear in boxes in the various chapters of the plan. To date, however, these successful strategies have not been pursued on a wide scale with the priorities and packaging essential to success. Several boxes in the chapters illustrate this success.

For more than twenty years, Himachal Pradesh has succeeded with a continuous focus on a small number of priorities. Demand-driven growth in high-value agricultural commodities has been the core of the strategy, along with a focus on rural roads. For Punjab, groundwater development, with a particularly effective technology policy and the desire to place every village on an all-weather road and provide it with electricity have been central. In each case, the accelerated agricultural growth drove the rapid growth in nonagricultural employment that was critical to the radical decline in poverty that has characterized all these success stories.

THE PROCESS OF PLAN FORMULATION

The APP is the product of a broad process of consultation and consensus building. Rural people and their representatives from the far reaches of the country were closely consulted, as were a wide range of technical people, representatives from the private business sector, the line agencies of government, and the donor community. The APP has also drawn heavily from successful experiences in Nepal, in other countries of Asia, and from broader historical experience.

The APP was formulated in three main stages. The first consisted of widespread consultation by a small group of Nepalese and foreigners who drew from widespread experience and scientific analysis a set of hypotheses indicating how the agricultural growth rate in Nepal could pick up from a stagnant state to one sufficiently dynamic to drive overall development. During the second stage, a team of seventeen Nepalese and four foreigners with a wide range of experience and technical knowledge prepared twenty-six background technical papers that contained the bulk of the factual and analytic basis of the plan. In the third stage, the plan itself was written on the basis of these technical papers and widespread consultations.

The various stages were guided by a steering committee. A total of 125 persons participated in the many committees and focus groups that conferred at various stages of plan development. Particularly intensive interactions with these groups occurred at the beginning and end of each of the three major stages. Focus groups were organized to indicate priorities for various ecological zones. Two major regional meetings in May 1994 and a national seminar in August 1994 had a large impact on the final revisions of the plan.

A Growth Accounting Framework (GAF) was developed to quantify the sources of growth, the required investment, and their commodity and regional impacts.

INPUT INVESTMENT PRIORITIES

The APP concentrates on four input investment priorities: irrigation, roads and power, technology, and fertilizer. The annual average investment in the priority inputs (the core of the APP) in the first five years is Rs. 4,201 million (table ES-1). A reduced plan calls for Rs. 3,367 million per year. For the reduced plan, the annual increment to expenditure in these categories is Rs. 707 million. Even of that modest sum, a substantial portion could be met by reallocations within the same broad line items.

Table ES-1: Public Investment in Priority Inputs and Outputs, Annual Average, First Plan Period, 1995/96 to 1999/2000
(millions of rupees)

Item	*Priority Inputs**	*Priority Outputs*
APP investment	4,201	1,278
Current investment	2,660	575
Plan increment	1,541	703
Alternative reduced APP investment	834	603
Adjusted Plan	3,367	675
Adjusted Plan increment	707	100

* Includes Rs. 100 million for institutional strengthening.

Source: APP calculations.

Irrigation

Irrigation investment comprises 56 percent of the priority input investment in the first five-year period of the plan. Seventy-one percent of the total irrigation investment and 46 percent of the terai irrigation investment is in surface schemes; 46 percent of the irrigation investment is in the hills and mountains. However, given the 50 percent proportion of shallow tubewell investment covered by farmers, the total public investment in irrigation increases by only 16 percent from present levels, with all of the increment accounted for by shallow tubewells. The average annual investment in surface schemes will be maintained at the present real level, with that allocation continuing to shift toward rehabilitation and farmer management and away from large scale surface schemes. The preceding numbers exclude new large-scale terai surface schemes, which are costed on a contingency basis but are not included in the GAF calculations.

Irrigation is vital to the terai strategy, far more so than in the hills and mountains, and shallow tubewells are the core of the terai irrigation strategy. Groundwater potential, corroborated in an extensive groundwater study and by actual development in similar areas of South Asia, are fully adequate to the strategy, particularly in the first ten years.

Groundwater plays a far larger role in the strategy than its share of investment because the costs of development of shallow tubewells are one-seventh as much per hectare as for new terai surface schemes, less than half as expensive per hectare as terai rehabilitation schemes, and only a quarter as expensive per hectare as hills rehabilitation schemes.

Thus, the institutional priorities must rest far more on shallow tubewell development than on other aspects of irrigation. Similarly, the road, technology, land reform and land consolidation, and fertilizer priorities at the district level must be packaged and prioritized so as to maximize the pace of groundwater development and achieve the returns calculated by the APP as appropriate and feasible.

Roads and Power

Agricultural road investment constitutes 20 percent of the priority input investment in the first five years of the plan. Of that investment, one-third is in the terai and two-thirds in the hills and mountains. Unlike the irrigation investment, almost all of the agricultural road investment is incremental to current levels and makes up 40 percent of the incremental investment. The agricultural road investment in the APP is essential to the high-value commodity strategy in the hills and mountains and to the shallow tubewell strategy in the terai. Thus, it must be coordinated with those activities in the package. The phase I (first ten years of the plan) road length additions of less than 10 kilometers per participating district is all too modest, but does still require the institutional changes specified.

Past road investment in Nepal has been directed almost entirely at trunk and district roads, with almost no investment in the grid of connecting agricultural roads that are essential to agricultural growth and, indeed, to the volume of traffic on the trunk roads essential to their financial profitability. The average annual agricultural road investment proposed for the first five years of the APP is equal to about half of the 1991 expenditure on roads. The APP concentrates on investment that will fill in the grid of agricultural roads. It also emphasizes that all roads must be regularly maintained, a matter greatly neglected in Nepal up to now, with disastrous consequences to the present state of the road network.

The agricultural road investment per kilometer is substantially higher in the hills and mountains than the terai—three times as much per kilometer in the hills and six times as much in the mountains, and with a lower standard of road. A growth strategy that leaves the hills and mountains out, however, loses half of the aggregate growth potential and half the people. And, agricultural roads are essential to the hill and mountain strategy. Although the incremental capital output ratios are somewhat less favorable for the hills and mountains because of higher construction costs, they are still highly favorable and must be pursued.

Rural electrification is also central to the APP strategy, particularly to the spread of tubewells, as well as to the activities that will stimulate employment by creating small enterprises. Because of the current shortage of power-generating capacity, however, rural electrification will have to be put off until the second five-year period of the APP. In the

following fifteen years, all of the terai and all parts of the hills and mountains with agricultural roads are also to receive electricity.

With completion of that grid, the rural power demands will be more than three times the current total power generation in Nepal. That demand is not now written into future power planning for Nepal. It must be in the future. Otherwise, it will be virtually impossible to realize broadly based, high-employment, low-poverty growth.

For the whole plan period, the distribution system for rural electrification is calculated to cost about two-thirds as much as the agricultural road network. Attention must be given to restraining costs, since the costs of both power generation and rural distribution appear to be considerably higher than in other countries of South Asia.

Technology

Only 9 percent of the priority input investment in the first five years of the plan is allocated to research and directly associated extension, but that calls for a doubling of the real expenditure over a ten-year period, with a further increase proportional to the growth in agricultural GDP. The investment is to be allocated first to increasing the resource support for the senior research staff and then to expanding staff. The unusually heterogeneous resource base in Nepal and the example of poor "spill-in" of research across state boundaries in India urge a strong national research system for Nepal.

Priority for the research and extension system is given to fertility research to complement the major increase in fertilizer use and the necessity of seeing that the large increase in fertilizer use is environmentally sustainable and friendly; to farming systems research, with particular emphasis on high-intensity systems suitable to year-round well-controlled water, particularly to shallow tubewell water; and to two sets of commodity priorities, those for the major food crops for which international centers exist and around which the research should be developed, and for the key high-value commodities (milk and high-quality fodder, citrus, vegetables and vegetable seed, apples, and the products of apiculture and sericulture).

Fertilizer

Under the APP, growth in fertilizer use will initially be higher than in the past few years but will be comparable to that of the preceding decade, and then will gradually slow down. At the same time, the absolute quantities of increments in fertilizer use will be large and continuously growing. That will require investment in fertilizer subsidies for the reasons discussed below under priority policies as well as a rapid expansion of the private sector in fertilizer distribution and orientation of the technology system to the efficient, profitable use of fertilizer.

Given the border pricing situation, 13 percent of the priority input investment in the first five years of the plan is allocated to fertilizer subsidies. It is hoped that changes in Indian policy will allow this to be gradually reduced.

THE OUTPUT INVESTMENT PRIORITIES

Investment for the output priorities is less carefully developed than for the input priorities, in large part because that investment is primarily in the private sector, with relatively modest public sector complementary investment required. Such investment also supports institutions, which are less tangible than most of the input priorities; furthermore, Nepal has master plans for most of the output priorities, which are far more comprehensive than the APP could be and at the same time were designed to focus on specific commodities with little attention to the scarcity of resources and their competing uses.

Thus, on the basis of master plan investments that relate specifically to the public investments in the priority outputs, a total equal to 30 percent of the input priority investments is stated in the first five-year period of the plan. One-third is for livestock, with a focus on milk, one-third for high value crops and agribusiness, and one-third for forestry. This represents a more than twofold increase from present levels (table ES-1).

The APP discusses where cuts in investments should be made if budget stringency does not allow the full investment plan. A major portion of the cuts are in the output priorities, on the assumption that the bulk of investment is in the private sector, that the input priorities are critical to private sector investment profitability, and that much of the output priority can be met by reallocation of present levels of public financing.

POLICY PRIORITIES

The APP achieves its unusually low incremental capital output ratios in substantial part through the four policy priorities that greatly increase the productivity of public investment.

First, and foremost, it proposes a public policy commitment to encourage an efficient, competitive private sector. All the policy priorities point in that direction. The emphasis is on reallocating public resources to solve the immense problems of the private sector due to inadequate transport and power; reorienting public institutions to complementing private sector investment, particularly in credit programs, but also in research and extension; and removing impediments to the free movement of goods and services across district borders.

Second, public policy must support the concentration of public investment in the four input priority areas, not only with financial allocations but with strengthened institutions. The essential resources cannot be appropriately reallocated without the active participation of the donor community. Thus, the government must make the priorities clear and enlist the active support of donors. In many cases, this will require a special effort to understand how the APP and its priorities actively forward donor interests in poverty abatement, women's participation, and environmental enhancement.

Third, several aspects of price policy take on enhanced importance in the APP. That is because the APP strategy makes output of all types far more responsive to price

signals than has traditionally been the case. Thus, the exchange rate, particularly with the Indian rupee, must be monitored closely in view of the critical role of agricultural exports arising from the return of the terai to generating exportable surpluses of cereals and the necessity of a vent for surplus as the hills and mountains obtain the economies of scale in high value commodity production through a high degree of specialization.

The APP spells out in detail why it is the Indian border price that broadly determines fertilizer prices in Nepal and the consequent necessity of substantial subsidies. The pace of growth in fertilizer use as well as in shallow tubewell development both argue for short-term subsidies to move the process along faster than the frictions of free-market prices would allow. The plan calls for ending interference with milk prices, including the seasonality of such prices. And, the risks to farmers in the high growth rate strategy call for price protection from short-term market failures. The details of these policies are spelled out in the main report.

Fourth, consolidation of highly fragmented holdings in the terai is important to the rapid pace of installation of shallow tubewells. Land tenure reform is important to the equity and investment aspects of the plan. Thus, land reform legislation, with a provision for consolidation, is a policy priority.

INSTITUTIONAL PRIORITIES

A vast array of public institutions play an important role in agricultural growth. The APP gives priority to strengthening five institutions that are critical to the success of the plan generally and the four input priorities specifically.

First, the implementing agencies of the APP need to be created. The National Support Committee (NSC) is to provide the overview at the national level. The proposed Independent Analytical Unit is needed to provide the factual, comparative data for advising the NSC. That unit requires a small high-quality staff and operating funds for conducting spot surveys. The district-level Subcommittee for the Implementation of the District Agricultural Program must be formed with a member of the District Development Committee as its chairman to coordinate district level activities, particularly of the key line agencies, to apply the prioritized productivity package and to recommend to the District Development Committee the sequence in which blocks should be brought into the prioritized productivity package.

Second, the proposed Department of Agricultural Roads must be created, adequately staffed, and provided adequate operating funds to ensure that the APP agricultural roads program is implemented. Not only is a new department required, but roads must be built at a faster pace than at any time in the past.

Third, the Agricultural Development Bank must be strengthened to serve as the lead agency for shallow tubewell drilling, to change its lending rules to finance the rapid growth of private fertilizer dealers, to finance very rapid growth in fertilizer use, and to induce private financing for the rapid growth of the priority outputs.

Fourth, the Agricultural Inputs Corporation must evolve to serve as the lead agency for meeting the fertilizer targets, with particular emphasis on assisting the private sector.

Fifth, the Nepal Agricultural Research Council must expand and redirect its research and increase its technical capacities, including close liaison with the Department of Agricultural Development, to provide extension services in the priority areas, particularly for fertilizer and soil fertility, integrated pest management, farming systems for high intensity levels, and for key commodities. The Department of Agricultural Development must also play an important role in ensuring quality products in the newly expanding high value commodities.

PHASING IN THE PLAN

The APP may seem to appear at first glance to stretch beyond the present reach of implementation capacity. The lack of agricultural growth over the past few decades encourages that view. However, the plan is intended to stretch capacities as the only means of getting onto the growth path that so many others have achieved. It does so at a time when the capacity for most of the priorities has been built to the critical mass for take-off. That is particularly true for shallow tubewells and fertilizer. The plan has three elements that facilitate achieving its high aspirations.

First, it draws its initial growth largely from increased fertilizer use. That increase occurs from maintenance of the already achieved growth rate, but of course with far larger absolute increase now that the base of use has become significant. Second, the growth comes relatively more from the terai than the hills in the early years of the plan in recognition of the greater difficulty of the input requirements for the hills and of the derived demand for the output from the hills. Third, the plan has a very few very tight priorities. If they are adhered to by the government, along with the donors, then obviously much more rapid institutional change and input investment can occur. It is for these reasons that the plan is presented as starting off quite rapidly.

It is also suggested in the reduced budget scenario that the hill road construction could be slipped by one plan period. If that road investment concentrates on agricultural roads, and the marketing and related changes in institutional structure are made, the targets can be achieved off the existing hill road network and the slower addition to hill roads. We note in any case the villages seem to be preparing themselves for much faster road construction than called for in the plan. They are showing great impatience.

Nevertheless, it may be argued that the institutional changes are sufficiently large as to require a further phasing in period. And, financing the plan will require substantial shift in donor allocations, which will take some time to occur. In any case, it is better not to hold out too high expectations and then have them dashed.

Thus, a phase-in period for the plan is recommended. We emphasize three points about the phase-in. It should be short—two years. A longer phase-in will lower expectations and increase the difficulty of implementation. Second, the investment resource must be made available at the full plan levels from the start. In order to change

the institutional changes with urgency finance should not be limiting for using the institutions. Of course, if this is implemented funds should be expected to lapse. Third, and most important, the phase-in must not be used to relieve emphasis on the priorities. It is implementation of the priorities that at once make feasible the challenging plan input targets and that at the same time provide the large output response.

A phase-in period is preferable to lowering the targets in the initial five year plan period. That is because the plan should be seen as an integrated approach that requires that a critical mass of growth be achieved. It must be presented and seen in that light. It does not disturb the integrity of the plan. Despite this position, the plan does present a low input, low response version in annex 3-C.

CONCLUSION

The APP offers the opportunity to put Nepal onto a fast growth track that will bring rural prosperity, a rapid decline in poverty, diffused urbanization, and an improved environment. It does so by setting a small number of priorities with respect to investment, policy, and institutions and by combining them into contrasting packages in the terai and the hills and mountains. It then specifies an implementing mechanism to ensure that shortcomings are diagnosed, necessary adjustments are made, and appropriate models are emulated. The result will be a radical decline in poverty, a rapid increase in rural incomes, the broad participation of women in growth and rising incomes, less population pressure on Kathmandu even while total nonagricultural employment grows rapidly, and a protected environment even as incomes rise.

IS THE TASK TOO DAUNTING ?

Certainly the APP calls for a striking acceleration in agricultural growth. It requires a large increase in investment on one area--roads. It requires major institutional and policy changes. Many of these have been attempted before. What is different in the plan? First, the plan is growth oriented as a necessary condition of all the other objectives. Second, it has tight priorities. To reform five institutions may be reasonable in short order; to reform the bulk of the public institutions is not. It has only four policy priorities. Again, obtaining change in those policies with the attendant political costs is reasonable, changing a much larger set is not. Donor agencies are collectively trying to change far far more institutions and policies than the APP priorities. There are two dangers. First, the cynicism that grows from lack of past priority may distract from attempting the effort necessary to make the small number of large priority changes in investment, institutions and policies. Second, the pressures will be constantly to add priorities, all the way to the present disastrous situation of spreading all effort so thin that nothing works. Success in weakening the priorities will of course reinforce the basis for cynicism and ensure that that prophecy is self-fulfilling.

8

LIVESTOCK[1]

THE IMPORTANCE OF THE LIVESTOCK SECTOR to development has already been well established: it is not only a fast-growing sector, but it accounts for a substantial share of overall growth. Under the APP, the growth rate of the livestock sector accelerates from 2.9 percent at the outset of the plan to 6.1 percent in the last five-year period (table 8-1). And its share in AGDP growth rises from 31 percent before the APP to 45 percent in the last period.

Table 8-1. Livestock Growth Rate and Proportion of GDP by Region, 1991/92 to 2014/15
(percent)

Region	*Livestock Proportion of GDP*		*Livestock GDP Growth Rate*	
	1991/92	*2014/15*	*1991/92 to 1994/95*	*2009/10 to 2014/15*
Terai	38	35	2.8	5.8
Hills	53	55	2.9	6.2
Mountains	9	10	3.0	6.4
Total	100	100	2.9	6.1

Source: APP calculations based on National Planning Commission (1993).

Livestock growth, as for all the output priorities, is largely demand- driven and dependent on private sector activities. Thus, the APP has few specific public sector recommendations to make for the sector. The plan does lag the livestock growth behind the plan because the livestock demand is largely domestically driven.

[1]This chapter draws heavily on the recently prepared Livestock Master Plan (HMG/AsDB, 1993).

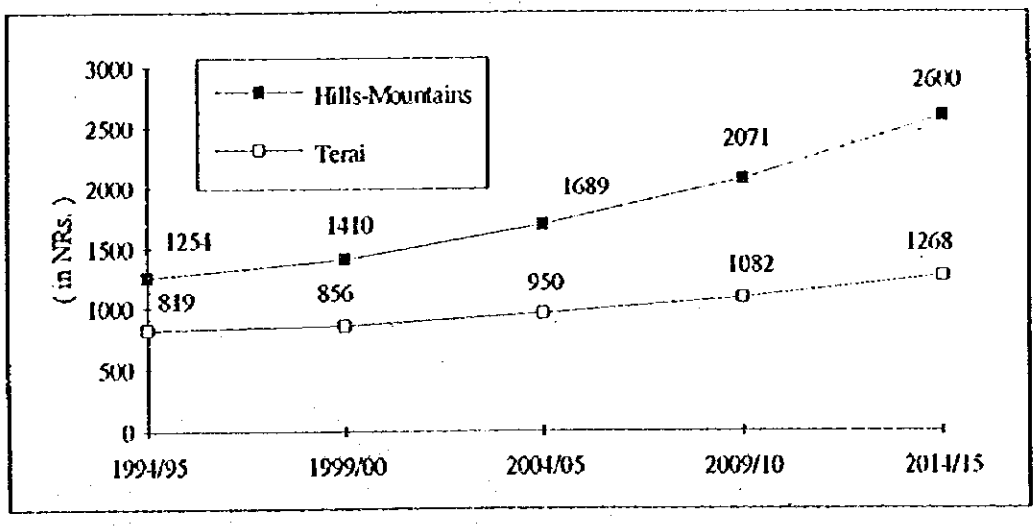
At present, the sector is growing slowly because the growth of per capita income is stagnant, one consequence being the current surplus of milk. The demand for livestock products is highly elastic with respect to per capita income. Thus as income growth accelerates under the APP, there will, after a modest lag, be an explosive growth in the demand for livestock products. This pattern is the norm in developing countries achieving fast growth.

The livestock sector can only achieve high growth rates if the expansion in crop production, the multipliers to other sectors, and the growth in livestock production itself propel per capita incomes at a rate greatly accelerated from that of the past. Since the plan is conservatively framed, that should be possible. Indeed, growth exogenous to agriculture in the nonagricultural sector may be faster than assumed in the APP. In that case, the APP assumptions for livestock growth will prove conservative. Further, some export potential does exist (for example, for Yak/Chauri cheese). Thus, policies and institutional development plans would best be based on the assumption that livestock targets will be overachieved rather than underachieved.

As stated many times in this volume, the growth emanating from the APP can be seen as a chain reaction: agricultural improvements cause income growth, which then generates growth in the livestock sector, which pushes up the overall growth rate. Livestock growth plays an even more important role in reducing poverty and enabling women to participate in the force. The livestock sector objectives will require an immense effort by the private sector, especially in input supply and dairy processing, and strong complementary public sector activities (HMG/AsDB, 1993).

Success in the livestock sector will also help Nepal achieve the regional balance objectives of the APP. Livestock are more predominant in the hills than in the terai and the APP provides a somewhat higher growth rate in the hills and mountains (figure 8-1).

Figure 8-1. Growth Path of Per Capita Livestock GDP in Terai and Hills and Mountains, 1994/95 - 2014/15



Source: APP calculations.

The APP assumes that supply response is highly elastic—that is, farmers will respond to increased opportunity as they have in the past. But some public investment will be required, particularly as aggregate production becomes larger and larger. Roads will be the most important investment for the development of the livestock sector.

In the past, when effective demand increased, the livestock supply quickly more than matched that increase—but only in areas with good transport since many of them were a long distance from urban markets. The commercial development of livestock, which is the objective of the APP, entails the buying of inputs (including concentrate feed) and the selling of output, which in this case is a perishable product that must be transported quickly if its high value is to be maintained. Thus, direct public investment in the livestock sector at the expense of the APP road target represents a misallocation of resources, even for achieving livestock growth.

The increased livestock investment will be made primarily by private farms for production and private firms for marketing and processing. In general, direct public investment in these activities would be counterproductive, because it would crowd out the more efficient private investment.

Over the long run, the Department of Agricultural Development will need to monitor and recommend actions to ensure adequate quality control and competitive conditions. In the short run, public facilities can play an important role in setting standards and providing competition. The critical issue is less one of privatizing these existing facilities than it is one of providing a level playing field with respect to pricing policy, so as to allow the private sector to develop. There should be no public subsidies of the processing and distribution systems.

In the greatly accelerated livestock growth regime of the APP, animal feed of requisite quality will become an increasingly important constraint to growth. Past growth rates could be accommodated largely by increasing the feed from traditional sources: natural grazing, scavenging, and by-products. The high growth rates of the APP will require greater use of high-quality forage and purchased concentrates, along with improved grasslands, including those adjacent to forestlands. With this change, research on fodder production and on animal nutrition will become all the more important.

Improved feeding will increase the returns to improved animals, and this will then increase the returns to improved management and health services. The Department of Agricultural Development will need to monitor the research program, ensure adequate extension, monitor and supplement the private provision of veterinary and other services, and oversee quality control and the effectiveness of competition in marketing and processing.

PRESENT STATUS

At present, livestock contributes 31 percent to the total AGDP of the country, and 53 percent of this amount is derived from the hills, 38 percent from terai, and 9 percent from the mountains (table 8-1). Milk is by far the most important livestock commodity (nearly half of livestock GDP), with meat next, much of which is a by-product of the

milk subsector. Fisheries, included as a subsector of livestock, has experienced very rapid growth in the past decade, but its weight in total AGDP is so low (initially 1.0 percent) that its aggregate impact on growth is modest. Sheep and swine are both of minor importance.

Three-quarters of all households keep cattle, and half keep buffalo, goats, and poultry (table 8-2). Livestock raising is an important agricultural enterprise of the poor families. About two-thirds of Nepal's livestock owners have less than 1 hectare of land, and women contribute significantly to livestock raising (National Sample Census of Agriculture for Nepal, 1991/92).

At present, crop residue contributes about 47 percent of animal feed, and the forests contribute 30 percent. The rest is supplied from noncultivated inclusions (risers/bunds, roadsides, and so on), shrublands, and grazing lands (HMG/AsDB/FINNIDA, 1988). Despite these sources, livestock are generally underfed—by about one-third (Pariyar, 1993). The low supply of forage from rangelands (that is, forests and grazing lands) is directly associated with low productivity and limited access. Forage yield from rangelands averages 0.2 metric tons of dry matter per hectare in the conifer forest, 1.2 metric tons in the flatlands, and 3.08 metric tons in the alpine meadows. Only 37 percent of the rangelands are accessible for forage collection, however (HMG/AsDB/FINNIDA, 1988).

Table 8-2. Percentage of Households Keeping Livestock and Birds by Region, 1991/92

Region	*Cattle*	*Chauri*	*Buffalo*	*Goat*	*Sheep*	*Pigs*	*Horses/ mules*	*Poultry*	*Ducks*
Mountain	82.8	2.9	44.8	55.5	6.5	10.3	1.3	56.4	6.0
Hills	77.3	0.1	60.0	54.2	4.2	12.2	0.4	67.6	9.2
Terai	74.4	0.0	35.8	46.8	1.8	7.1	0.4	32.4	15.7
Nepal	76.6	0.3	48.5	51.3	3.4	9.9	0.5	51.9	11.6

Source: National Sample Census of Agriculture for Nepal (1991/92).

The supply of waste and scavenging feed is inelastic: even with the best of efforts in forest and grassland improvement, more and more feed must come from high-quality fodder produced in competition with other crops. The rapid increase in yields of field crops envisioned for the APP will facilitate the needed transfer of area, if commensurate improvements in fodder yields also occur.

THE ROLE OF WOMEN

The expansion of the livestock sector, driven by rising incomes, offers the single most important opportunity to bring women into the commercial production system and to raise their incomes. Women contribute 70 percent of the work effort in livestock

raising and are more knowledgeable than men about treating sick animals (Sharma and Awasthi, 1993). Livestock are not only disproportionately found on the small and marginal farms and with the landless, but women are disproportionately represented in those groups. In contrast to the opportunity that is available, women tend to be excluded from extension, marketing, credit, and other activities critical to increasing livestock productivity and incomes (HMG/AsDB, 1993). Given the high growth rates expected of the livestock sector, efforts to improve the lot of rural women should be targeted on this sector.

Women's needs (for example, for time-saving technology) are not considered in the conduct of research, nor is the extension education system tailored to women farmers (for example, curricula, timing, and training locations are not chosen with the participation of women farmers in mind). Moreover, the present system does not sufficiently target women farmers for other extension activities, such as farmer tours and exposure to extension materials.

Women farmers are also usually excluded from planning processes and have no access to lending institutions, except for a few Small Farmers Development Programs, the Production Credit for Rural Women program, and the recently introduced Rural Development Banking Program. There are many unfortunate instances in which women—and the entire family—have been excluded from development activities simply because they do not have rights to family property and the husband either does not want to participate in the economic activity as proposed by the wife or is absent.

The strategic policy response must ensure, first, that a sound planning system is developed to enable women farmers to participate in all stages of the planning cycle for livestock production and marketing and in extension education activities. Second, an appropriate banking system should be developed to provide women with easy and direct access to financial institutions. Third, technology improvements should be designed specifically to relieve women farmers from their time burden. And fourth, training curricula should be developed to fit the timing and formal education level of the women farmers.

COMMODITY PRIORITIES

The commodity priorities for livestock are simple and flow directly from the initial weights in output, the demand elasticities (chapter 3), and the past record of growth. Milk and the associated meat production are by far the most important of these priorities. Initially, growth efforts will focus almost exclusively on milk animals, with an emphasis on animal nutrition, feed supplies, veterinary services, and marketing. The third priority is to expand poultry production, which has already shown rapid growth and carries some weight in the AGDP, followed by goats, the fourth priority.

The APP is by and large a positive plan, with little emphasis on what should not be done. In view of the pernicious theory of import substitution and the importance of the carpet industry in Nepal, however, a warning about sheep seems in order. Sheep are currently inconsequential, and there is ample evidence that they do not and are unlikely

to have comparative advantage in Nepal, beyond a few niches. But, a look at the vast imports and a naive assumption about the ecological zones in Nepal are apt to lead to a sheep priority. Although that would divert research resources from needs of higher priority, the greater danger is that the local industry would be protected—an action that would almost certainly kill the vastly more important carpet industry, given that it is entering a phase of increased foreign competition.

POLICY

Livestock policy should be guided by the realization that the livestock sector is a private sector. Public policy must be designed to complement and help private farmers and business people compete efficiently and thus meet the high growth rate targets for the sector. The most critical policy measure promoted by the APP for the rapid development of livestock is to meet the road and electric power targets delineated in chapter 7.

All subsidies for livestock processing and marketing must be eliminated in order to provide free entry for the private sector. Thus, public sector institutions must privatize or remain free-standing units that receive no subsidies and that raise all their capital needs themselves (HMG/AsDB, 1993). The National Dairy Development Board (NDDB) can play a positive role in promoting the private sector role in milk processing and marketing.

Government rules and regulations that inhibit free markets and private activity (for example, restrictions on the movement of livestock commodities across district lines) must be removed. At present, the Dairy Development Corporation keeps the producer price of milk level across seasons (except for an adjustment for fat content), despite sharp seasonal differences in the cost of production. This policy restrains consumption in the low-cost season causing a seasonal glut of milk, and encourages imports of milk powder in the high-cost season. It is important that the market price system be used to obtain an optimal seasonal fluctuation in price and consumption. With such a regime, consumption would fluctuate more seasonally than at present and production less. Wide seasonal fluctuations in milk production are likely to continue in future. In order to minimize the differences in supply arising from such fluctuations, it is essential that the private sector be encouraged in the processing and marketing business.

To help develop a competitive private sector, more steps should be taken to set and enforce grades and standards, establish market information systems, improve veterinary services, and scrutinize imports of products like skim milk powder to ensure that they conform with GATT rules.

Another important measure would be to firmly enforce the Aquatic Life Conservation and Utilization Act of 1993, which is designed to improve the aquatic and terrestrial environment and help increase fish production from natural water resources.

INVESTMENT

As already mentioned, the public sector's first order of priority with regard to the livestock sector is to invest in transport. Irrigation investment is also important, because it will promote income growth and growth in the supply of high-quality fodder. Only after these investments are made at the full APP level should the items discussed next move up in order of priority. Direct public investment in the livestock sector should largely be for research and extension, and for training and institutional building in the areas of credit, local organization, and marketing.

The Livestock Master Plan called for an investment of $304 million dollars in livestock (including fisheries) over twenty years. This translates into $15 million per year, of which one-third is marked for private sector promotion (table 8-3). Besides, much of the investment specified in the Master Plan is probably generated in the private sector and therefore need not be accounted for in the public investment budget. Chapter 16 suggests an incremental investment of $10 million per year .

Table 8-3. Livestock Master Plan Investment by Line Item, Twenty-Year Projection
(millions of U.S. dollars)

Line Item	*Years*			*Total*	*Total(%)*
	First Five	*Second Five*	*Second Ten*		
NGOs and private-sector promotion	4.0	30.0	54.7	88.7	29.2
Capital cost	20.5	27.5	5.4	53.4	17.5
Training and fellowship	6.0	6.5	4.1	16.6	5.5
Technical assistance	15.1	11.0	11.3	37.4	12.3
Incremental operating costs	2.5	12.0	28.0	42.5	14.0
Incremental manpower	1.0	3.0	7.5	12.0	4.0
Credit	4.0	10.5	20.0	34.5	11.3
Others	3.0	5.8	10.0	18.8	6.2
Total	56.1	106.8	141.0	304.0	100

Source: HMG/AsDB (1993).

INSTITUTIONS

The private sector must be primarily responsible for the expansion of the necessary production, marketing, and processing activities for livestock in the APP. Thus it is critical that the market pricing system be left to operate so as to direct activities to the most economical and effective technology and management systems. However, five public sector institutions will have an important complementary role in the development

of these private sector activities: the Nepal Agricultural Research Council for technology development; the Department of Agricultural Development for extension, regulatory, and other facilitatory activities; Agricultural Development Bank of Nepal for finance; district bodies (see chapter '18 for details) for decentralized activities; and farmers and trade organizations, in which NGOs have an important organizational role.

Nepal Agricultural Research Council

As explained in chapter 6, livestock research is given a high priority in the expansion of the NARC, in keeping with its heavy weight in AGDP growth under the APP. Within livestock, dairy is the first priority, and at least in the short run, the buffalo is the priority animal. Given the poor state of animal nutrition and the current lack of emphasis on fodder crops, close attention should be given to animal nutrition and the principal fodder crops, particularly berseem, stylo, oats and vetch during winter, and maize, cowpea, teosinte and sorghum during the summer season. This emphasis should include efforts to improve natural pastures and develop them in the context of community forestry. As the feeding problems are brought under control, emphasis can shift to broader management issues and to improved breeding. As laid out in the Livestock Master Plan (HMG/AsDB, 1993), it is essential that women farmers participate in planning and designing livestock research activities.

Department of Agricultural Development

The DOAD has several critical responsibilities in the drive to greatly accelerate livestock production and should step up its efforts in these areas accordingly.

First, the extension system needs to be upgraded, given a sharper focus, and encouraged to give special attention to women in livestock production. In doing so, it must work closely with the NARC. It should also interact with the NARC and the Forestry Department in the move to improve pasture on forestlands. As part of its extension activities, the DOAD also needs to develop the capacity to provide financial and managerial training to the small private marketing and processing sector.

Second, the DOAD's regulatory functions need to be strengthened. The private sector is unlikely to ensure quality in the near future. This problem is difficult to resolve, but a start must be made by introducing minimum quality standards. These will encourage producers to increase the quality of their products.

Third, the veterinary system needs to move toward privatization, that is, toward charging a fee for services. However, the emphasis must be on providing good veterinary service, and the privatization must be carried out in a manner that increases the quality and quantity of those services and brings them more in line with farmer needs. Those are the objectives, not privatization per se.

The DOAD can meet the majority of these needs by shifting its priorities. At the same time, skills throughout the department will have to be radically upgraded, through

a large training effort at all levels. The message should be that the DOAD as a whole is being upgraded, and that this effort should be guided by the APP priorities.

Agricultural Development Bank of Nepal

Farmers need loans to purchase animals, market livestock, and process and market livestock products. A large proportion of livestock farmers are poor and have little access to formal lending institutions. Many of them have no land or insufficient land to offer as collateral, or are tenants and thus have no right to use that land as mortgage. Moreover, women—even though they provide more than 70 percent of the livestock labor—have little access to these institutions for borrowing. The present system has overlooked the ability of women and the poor to raise livestock. These problems cannot be properly addressed without administrative and legal changes pertaining to the ADBN. Commercial banks should also be strengthened so that they could perform these roles.

Local and Private Organizations

The purpose of strengthening local institutions is to make livestock producers and entrepreneurs capable of carrying out livestock production (which includes supplying the inputs) and marketing livestock and livestock products on their own. To this end, it will be vital to strengthen the capacity of the District Development Committee to facilitate livestock development; and to encourage the livestock commodity and user groups to appropriately use their group funds for development or entrepreneurial activities.

Drawing guidance from the Livestock Master Plan (HMG/AsDB, 1993), all the above activities should be supported by providing appropriate training and communication to the farmers, with particular emphasis on the participation of women, as well as the concerned entrepreneurs and NGOs. Such participation can only take place with the aid of well-motivated and well-trained personnel in the field. This approach is expected to help bring farmers together in the planning cycle, help them decide on the best use of scarce resources available locally or externally, and help them arrive at their own strategy for further development. The emphasis must be on commodity and other trade organizations, such as the milk producers association. Delegating research, extension, and other activities to them, as appropriate, will help strengthen them.

INTERNATIONAL TECHNICAL ASSISTANCE

The basic thrust of foreign technical assistance must be to strengthen the livestock component of the key institutions—NARC, DOAD, ADBN, local government, and farmers and trade associations. Assistance is primarily needed to train and upgrade staff, and to organize and support farmers in the field of entrepreneurial activities, particularly for dairy processing and marketing.

9

HIGH-VALUE CROPS

THE HORTICULTURAL SECTOR, PARTICULARLY IN THE hills, can be driven largely off export demand from India, at least in the initial five years of the APP. Thus, it need not be lagged as much as the livestock sector. However, since the growth has for reasons of convenience been accounted as driven by domestic demand, its potential for expansion is far more rapid than called for in the APP. That however calls for substantial emphasis on developing and facilitating private sector marketing. It is correct to say that for these products the problem is not markets but marketing. The Rapti Development Project experience with vegetable and apple pockets has clearly demonstrated the ease with which the Indian market can be entered if modest efforts are made to facilitate the private trade. The chapter states broadly what the institutional development needs are for this. In execution the excellent experience of the Rapti development project can be drawn upon as illustrated in the two boxes in chapter 10.

Over the course of the APP, the income from high-value crops is expected to triple. The annual growth rate of these crops will accelerate from 4.8 percent to 5.8 percent (chapter 3, annex tables), and, what is particularly promising, production may expand at possibly even higher rates than predicted because high-value crops have strong export potential. Indeed, their development requires an export-driven strategy.

Horticulture contributes about 13 percent of the agricultural growth rate and is therefore of great importance to the various APP objectives, although it is still less than half as important as the livestock sector. Furthermore, it shows great potential as a provider of off-season vegetables, and thereby illustrates the strategic complementarity between the terai and the hills and mountain regions of Nepal. Far from competing with each other, winter vegetables from the terai and summer vegetables from the hills could help supply produce year-round, develop and sustain domestic demand, and increase human nutrition throughout the country.

For convenience, the GAF considers the growth rate for horticulture to be demand-driven. That is, as per capita income rapidly increases and with income elasticities of demand of 0.8 and 1.0 for vegetables and fruits, respectively, the demand for these commodities increases and can be met by an increase in supply. This

assumption gives a growth rate that seems manageable despite the risks and other constraints on expansion of the horticultural sector.

At present, Nepal imports 67 percent of its vegetable consumption and 85 percent of its fruit consumption (Winrock, 1993). Although these percentages could be reduced if efforts were made to extend the Nepal season through research and management, in practice self-sufficiency may well decline as Nepal reinforces its comparative advantage in a small number of high-priority horticultural commodities. The exchange rate with the Indian rupee is a critical determinant of Nepal's ability to export to India and hence to the success of the horticultural production. In the past, even a favorable exchange rate would elicit little growth in exports because of the severe supply constraints and transport difficulties. The APP will relax that constraint, making the exchange rate an important issue.

Despite the apparent potential of high-value crops, they also have their problems. For one thing, they are risky to grow and therefore are shunned by small farmers, who have an aversion to risk. Nevertheless, Nepal's farms are smaller on average than those in the successful horticultural specialization areas of Himachal Pradesh, India. This creates an added risk aversion. The policies for the sector will have to deal with that risk aversion through research, infrastructure, strong support services, and credit programs.

Another problem is food security, which is particularly complex when it comes to high-value crops. The risk aversion of small farmers will discourage them from switching land areas from basic food crops to more productive high-value crops. As farmers develop faith in markets, their incomes will rise through specialization, and they will be better able to ensure food security on the market.

The APP strategy for the high-value crops sector is a private sector strategy. The role of government agencies, while important, is small. The strategy emphasizes raising incomes and hence effective demand; investment in roads to increase the regional participation in high-value crop production; investment in irrigation to reduce the risks in high-value commodities; strong research support, again to reduce risks; and strong support of the DOAD in several activities, primarily to assist private-sector development. Above all, the strategy calls for commodity priorities within the sector, with the drive to establish priorities in all the other aspects of the APP.

PRESENT STATUS

High-value crops account for 8 percent of the total cropped area of Nepal (table 9-1). The horticulture crops contribute 14 percent of total agricultural GDP (APP-GAF).

High-value crops are particularly critical to future rapid growth in incomes in the hills and mountains. They offer an opportunity for high income per hectare in areas of acute land scarcity with favorable income generation, poverty reduction, and environmental effects. The secondary employment potential in processing and marketing is large. In addition, environmental benefits accrue from the high value of output per hectare, which helps withdraw marginal lands from agriculture, and from the high-value tree crops on slopes.

Table 9-1. High-Value Crops by Region, 1990/91
(thousands of hectares)

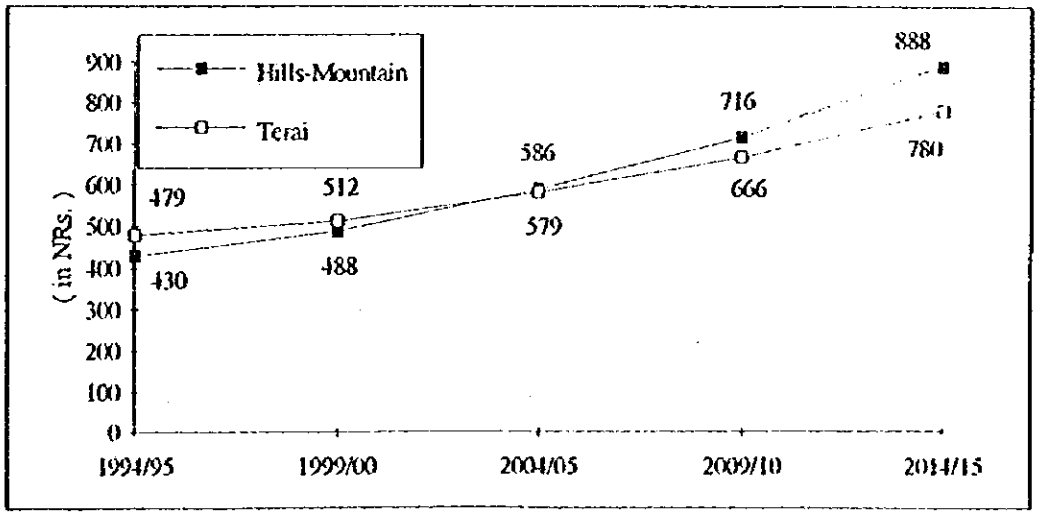
Crop	*Mountains*	*Hills*	*Terai*	*Nepal*
Fruits	11.0	37.0	20.0	68.0
Vegetables	7.0	50.0	83.0	140.0
Potato	17.0	49.0	19.0	85.0
Cardamom	n.a.	6.0	n.a.	6.0
Ginger	n.a.	343.0	n.a.	3.0
Spices (turmeric, garlic)	n.a.	2.0	2.0	3.0
Tea	n.a.	1.0	2.0	3.0
Coffee	n.a.	0.2	n.a.	0.2
Mulberry (for silk-worm)	n.a.	0.5	n.a.	0.2
Total	35.0	149.0	125.0	309.0
Ratio of high-value crop to total crop (%)	10.0	10.0	6.0	8.0

n.a. Not applicable.

Source: Ministry of Agriculture estimates.

The proportion of area planted with high-value crops is higher in the hills and mountains than in the terai (table 9-1). Vegetables are somewhat more important in the terai, and fruit in the hills and mountains. Vegetables are about evenly split between summer and winter. The value of vegetable production is 45 percent greater than the value of fruit production (table 9-2). Within fruits, citrus represents half the total. The expected growth path of per capita horticultural GDP is demonstrated in figure 9-1.

Figure 9-1. Growth Path of Per Capita Horticultural GDP in Terai and Hills and Mountains, 1994/95 - 2014/15



Source: APP calculations.

Table 9-2. High-Value Crops, Value of Production, 1990/91
(millions of rupees)

Crops	*Mountains*	*Hills*	*Terai*	*Nepal*
Fruits	170	595	417	1,182
Citrus[a]	n.a.	590	n.a.	590
Vegetables	76	590	1,049	1,714
Vegetable Seed	21	n.a.	n.a.	21
Potato Seeds	n.a.	419	n.a.	419
Sericulture	n.a.	54	n.a.	54
Honey	n.a.	14	n.a.	14
Ginger	n.a.	318	n.a.	318
Spices[a]	n.a.	214	n.a.	214
Cardamom	n.a.	183	n.a.	183
Tea[b]	n.a.	60	n.a.	60

n.a. = not applicable/available.

Note: Vegetable seed production in mountain and hills are together under mountain. Tea production in hills and terai are put together in hills. Fruits in mountains are mainly apples.

a. Agricultural Marketing Information Bulletin (Bikram era 2050).

b. National Tea and Coffee Development Board (1993).

Source: Production and value, Ministry of Agriculture (1990/91).

ENVIRONMENT

Tree crops are a major component of high-value crops and of course have a favorable environmental impact, particularly on hill slopes. At the same time, high-value crops are often heavily sprayed with chemicals, with the consequent danger of pollution. Chapter 13 outlines the requirements of a strong integrated pest management program and minimum use of chemicals.

GENDER

Women play a vital role in the production of all high-value commodities, most notably in sericulture (where they account for 79 percent of labor), vegetables (67 percent), ginger (64 percent), and vegetable seeds (58 percent) (table 9-3). These commodities have a vast potential to create more employment and entrepreneurial opportunities, and it is important that the institutional structure be open to women and

structured to service them. The major problems of risk and risk aversion need to be addressed particularly from the point of view of women.

Table 9-3. Contribution of Women's Labor to High-Value Commodities, 1992
(percent)

Commodities	*Contribution*
Fruits	46
Apple group	54
Citrus group	48
Mango group	33
Vegetables	67
Vegetable seeds	58
Sericulture	79
Ginger	6

Source: No Frills Consultants (1991).

The NARC should be making a specific effort to involve women in trials of high-value commodities and to find work to reduce the labor burden on women. In addition, the DOAD could include more women in extension activities, particularly in harvest and postharvest handling and marketing, and the ADBN could orient its loans to high-value commodities grown by women.

COMMODITY PRIORITIES

Nepal has the diversified climatic conditions and the natural resource base to produce a wide variety of high-value crops at low cost. Thus, one of the critical problems for the APP is to set priorities that will limit the number of commodities emphasized to allow adequate scale economies in the scarce research, extension, market development, and administrative services so essential to the development of high-value crops. This need to set priorities and to specialize is apparent in both the public and private sectors.

Under the APP, the emphasis is on the following high-value crops in the areas and order indicated: (1) citrus, throughout the mid-hills; (2) apple, in the inner Himalayan zone; (3) off-season vegetables in the hills as well as the terai; (4) vegetable and flower seed in the hills and mountains; (5) beekeeping products in the hills and mountains; and (6) raw silk in the hills. These priorities are discussed more fully in chapter 14 on the hills and mountains.

Vegetables are an obvious priority because they are much more important than any other high-value commodity (a small number of vegetables dominate the group), they are less risky to grow than fruit because they are an annual crop, and since twice as many women as men participate in vegetable production they provide women an opportunity to increase their income (in terms of marketing and cash incomes). Citrus is also an obvious choice because it is by far the most important fruit in Nepal and is grown throughout the hills. Apples are much less important, but have great potential in the mountains, and their relative importance will increase substantially when roads begin pushing back into the mountain areas (particularly in Jumla). Beekeeping (honey) is currently inconsequential (only Rs. 14 million of output), but it is complementary to horticulture and represents an economic opportunity for very small farmers. Sericulture is also inconsequential now (only Rs. 54 million of output), but it offers a special opportunity for women and seems to be particularly well suited to Nepal's hills. Table 9-4 reflects these priorities in various land use categories and the research stations in charge of them. Figure 9-1 depicts the lead commodities by hill and mountain ecological planning units (EPUs).

This seems to be a large set of priorities if effective programs are to be developed for each. The "new trade economics" provides a clear conceptual basis for understanding why countries specialize more than the physical environment would lead one to expect. In the modern world, technology has become essential to growth, but scale economies are so important in generating the necessary technology that added specialization is needed. The same is true of scale economies in developing marketing systems, particularly those geared to quality-conscious export markets. It is notable that although developing countries as a whole cover a large number of horticultural commodities, any one country specializes in just a few.

Nepal needs to choose its priorities now in order to direct the necessary institutional development; but the decisions can be gradually modified over time as changing comparative advantage reduces the potential of some commodities and increases that of others. In the final analysis, the market must determine these priorities. When a clear error of omission (or commission) has been made, recognition of that mistake by the market must be quickly noted and the appropriate complementary institutional investments made.

Table 9-4. High-Value Crop Priorities, Target Production Environments, and Research Stations

Commodity	Land Use Categories[a]		Station[b]	
	Hills	Mountains	Commodity Center	Regional
Citrus	Unirrigated upland slopes, upland slopes currently under orchard	Unirrigated upland slopes, upland slopes currently under orchard	Dhankuta	Rasuwa, Pokhara, Dailekh, Dadeldhura
Apples	Unirrigated upland slopes, upland slopes currently under orchard	Unirrigated valley bottomland, unirrigated upland slopes, upland slopes currently under orchard	Jumla	Rasuwa, Marpha, Baitadi
Vegetables: Main season	Upland slopes with year-round irrigation		Khumaltar	Pakhribas, Kabre, Lumle, Jumla, Baitadi
Off-season	Valley bottomland with year-round irrigation	Upland slopes with year-round irrigation, valley bottomland with year-round irrigation	Khumaltar	Pakhribas, Kabre, Lumle, Jumla, Baitadi
Vegetable seed	Upland slopes with year-round irrigation	Upland slopes with year-round irrigation, valley bottomland with year-round irrigation	Khumaltar	Pakhribas, Kabre, Lumle, Jumla, Baitadi
Beekeeping	All	All	Godavari	Pakhribas, Kabre, Lumle, Rukum, Baitadi
Sericulture	Unirrigated upland slopes		Khopasi	Pakhribas, Kabre, Lumle, Jumla, Baitadi

a. Target production environments in the Hills and Mountains have been classified according to current land uses.

b. Locations shown in Figure 14-1. The "Commodity Center" column identifies the research station responsible for the national program in the given commodity. The regional column shows the station with the development mandate for the Hill and Mountain EPUs in a given east-west growth corridor within the region. Stations in boldface are the Hill and Mountain Research Centers that should oversee and coordinate all commodity research.

Source: APP Focus Groups.

INVESTMENT

The bulk of the direct investment in high-value commodities is private sector investment by farmers and business people. As in the case of livestock, the most important public investment is for roads. Although there is some potential for nonperishable commodities of sufficiently high value per unit of weight, which can overcome the high costs of isolated locations, the norms are for perishability and the need to commercialize. Perhaps most important, marketing, processing, and the provision of services, including extension services, all depend on a high density of output to achieve low costs. Thus, a full grid of all-weather roads is essential to the high-value crops. Such a grid of roads throughout the terai and in all hill areas, starting with existing district level roads, is a prime priority in the APP. The hill roads are essential if the region is to realize its potential to "catch up" with the terai.

Irrigation investment is also important to high-value crops. Crops cannot be ensured without an adequate water supply. Indeed, well-controlled year-round water on the terai would open up vast opportunities for growing off-season vegetables. In the hills and mountains, too, the risk associated with high-value crops would be reduced if water supplies could be counted on. Details about the required irrigation investment can be found in chapter 4.

Beyond roads, irrigation, and research, public investment requirements for high-value crops are modest, as is the case for livestock. Those investments are primarily for a range of DOAD activities (including extension and quality control), for increased ADBN lending, and for local government organizations, farmers' organizations, and the NGOs that assist in organizing farmers. Chapter 16 sets one-half as much of such investment for high-value crops as for livestock, in addition to the NARC priority to high-value crops.

INSTITUTIONS

Five sets of public activities are important to the sector: research, extension, finance, regulatory activities, and local organization. Accordingly, the NARC, DOAD, and ADBN will play a role in the sector.

Nepal Agricultural Research Council

Up to now, the NARC has contributed little to the development of high-value crops. The national and regional priority is weak and lacks guidelines for research, and there are no strong ties with national, regional, and international research institutions to speak of. This poor performance can be traced to organizational instability, the lack of priorities, and the lack of an adequate data base for analysis.