

Compendium of ILRI Research Impacts & Adoption 1975–1998



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Compendium of ILRI Research Impact and Adoption, 1975–98

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This compendium will be updated regularly. As this is the first edition, there are bound to be omissions and errors. Please send any comments or additions to us, so that we can update and correct subsequent editions.

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Introduction

This document lists and summarises studies by ILRI and its predecessors, ILCA and ILRAD, on the adoption and impact of their research output. It will be updated regularly as old activities are completed and new ones are started. It says nothing directly about the adoption and impact of technologies developed by ILRI and national and international collaborators, although the summaries give a good approximation of such information, where it has been generated.

The recent development of the evaluation culture in agricultural and many other types of research has had, and continues to have, a profound effect on the way in which many scientists see their work. It has brought new emphasis to impact assessment, to the point where ILRI, in common with other CGIAR centres, is now devoting considerable human and financial resources to it.

Impact assessment covers a wide variety of activities and has been carried out at ILCA, ILRAD and ILRI for many different purposes. In general, the results of impact assessment may be used by donors to help evaluate requests for funding, by research managers to help in priority setting and resource allocation in an institute and by scientists to help ensure that research activities are better designed, better implemented and better targeted at potential beneficiaries.

Impact assessment may be done after the research has been carried out (*ex post*) or during the planning stage (*ex ante*). Beyond this basic distinction, it is possible to distinguish four general activities related to impact assessment:

- Adoption studies provide information on adoption of an innovation and the factors that constrain or facilitate its uptake. The tools used in such studies include farmer surveys, case study methods, econometric analysis and a host of other systems analysis and characterisation tools that help determine (past or future) recommendation domains.
- Economic impact assessments attempt to evaluate the economic benefits associated with a piece of research and to quantify the costs involved, in the same general way in which an investment can be analysed. The (many) tools that may be used include economic surplus methods, econometric analysis, scoring techniques, cost-benefit analysis, simulation models and mathematical programming models.
- Social and environmental impact assessments examine the broader effects of research projects on, for example, biological diversity, soil erosion and human welfare and nutrition. The plethora of tools that may be used range from formal economic evaluation methods such as cost-benefit analysis and contingent valuation to case study methods and a host of modelling techniques.
- The development of methods and tools that can facilitate impact assessment or that are designed to push back the frontiers of the art and science of impact evaluation.

To help the reader understand quickly the type of activity that each entry represents, we have attempted to classify each activity in the compendium according to the following simple typology:

- Is the activity concerned primarily with developing tools and methods that can be applied to research evaluation? If yes, the activity is classified under **METHODOLOGY DEVELOPMENT**.

- Is the activity concerned primarily with research that has already been carried out? If yes, the activity is classified as *EX POST ASSESSMENT*, if not, it is classified as *EX ANTE ASSESSMENT*
- Is the activity concerned primarily with adoption of an innovation, either directly or in relation to the definition of recommendation domains? If yes, the activity is classified as *ADOPTION*
- Is the activity concerned primarily with the impacts of an innovation? If yes, the activity is classified as *IMPACT ASSESSMENT*. If the major realm of the analysis is economic, environmental or social impact, the activity is further classified *ECONOMIC*, *ENVIRONMENTAL* and *SOCIAL ASSESSMENT*, respectively

The resulting classification is shown in Table 1. It should be noted that this classification is indicative rather than comprehensive. Indeed, a number of the activities in the compendium have strong elements of more than one class (e.g. having elements of both adoption and impact assessment or both *ex ante* and *ex post* components). However, it does afford a quick assessment of a (if not the) major preoccupation of each activity. Thus, if the reader is interested in *ex post* economic impact assessments, these can be quickly identified. Of the 53 activities in this edition of the compendium, 43% are classified as *ex ante* economic impact studies and 23% as *ex post* adoption studies. Currently, none of the activities listed are classified as *ex ante* social impact studies or as *ex post* environmental impact studies but the other seven categories in the classification are represented.

In the compendium, activities appear in approximate chronological order of their starting date. For those activities that took place before 1995, an attempt has been made to fit them within the current three programme, 20 project structure of ILRI. This is reflected in the 'ILRI links' section of each summary and in the programme-project matrix in the Annex.

Table 1 Classification of impact evaluation activities in the compendium

EX ANTE	ADOPTION		Type 1
	IMPACT	ECONOMIC	2
		ENVIRONMENTAL	3
		SOCIAL	4
EX POST	ADOPTION		5
	IMPACT	ECONOMIC	6
		ENVIRONMENTAL	7
		SOCIAL	8
METHODOLOGY DEVELOPMENT			9

Summary table of ILRI impact and adoption assessments: 1975 to date

No	Analysis	Type	Status	Start	End
1	Impact of chemoprophylactic control of trypanosomosis in coastal Kenya	<i>Ex post</i> economic impact	Completed	06/82	10/86
2	Economic impact of N'Dama cattle in tsetse affected areas of Zaire, Togo, Ethiopia and The Gambia	<i>Ex post</i> economic impact	Completed	01/86	12/89
3	Adoption of dairy feeding management in the Ethiopian highlands	<i>Ex post</i> adoption	Completed	1987	1992
4	Costs and benefits of alternative theileriosis control strategies in Zimbabwe	<i>Ex ante</i> economic impact	Completed	1988	1989
5	Impacts of East Coast fever immunisation in coastal and highland Kenya	<i>Ex ante</i> economic impact	Completed	1988	1994
6	Fodder bank adoption in northern Nigeria	<i>Ex post</i> adoption	Completed	1989	1995
7	Impact of land tenure on adoption of alley farming in West Africa	<i>Ex post</i> social impact	Completed	1989	1992
8	Impact of crossbred dairy-draft technology in Ethiopia	<i>Ex ante</i> economic impact	Current	01/89	12/98
9	Impact of livestock on alley farming systems in West Africa	<i>Ex ante</i> economic impact	Completed	1994	1996
10	Impact of dairy intensification on African peri urban milk production systems	<i>Ex ante</i> economic impact	Current	1990	12/98
11	Constraints to use of animal traction in semi arid West Africa	<i>Ex post</i> adoption	Completed	01/91	12/92
12	Impacts of dairy intensification on nutrition and health in coastal Kenya	<i>Ex post</i> social impact	Completed	1991	1991
13	Economic impact of theileriosis and its control in Africa	<i>Ex ante</i> economic impact	Completed	1991	1993

14	Milk production potential of crossbred cows in the Ethiopian highlands	<i>Ex ante</i> economic impact	Completed	01/92	12/97
15	A rapid adoption assessment of Vertisol technology	<i>Ex post</i> adoption	Completed	05/92	06/92
16	Economic cost of trypanosomosis in The Gambia, Zimbabwe, Cote d'Ivoire and Cameroon	<i>Ex ante</i> economic impact	Completed	1993	1993
17	Impact of dairy intensification on women in coastal Kenya	<i>Ex post</i> social impact	Completed	02/93	1995
18	Returns to ILRI's theileriosis research	<i>Ex ante</i> economic impact	Completed	1993	1993
19	Adoption of an improved Vertisol management package in Ethiopia	<i>Ex post</i> adoption	Completed	1993	1994
20	Economic impact of heartwater and its control in Zimbabwe	<i>Ex ante</i> economic impact	Completed	1994	1997
21	Farmer preferences of cattle breeds in southern Nigeria	<i>Ex post</i> adoption	Completed	01/94	05/97
22	Evaluation of Vertisol/broadbed maker technology	<i>Ex post</i> adoption	Completed	06/94	06/94
23	Constraints to dairy intensification in Kenya	<i>Ex post</i> adoption	Current	01/95	12/99
24	Economic impact of trypanosomosis on dairy production in Uganda	<i>Ex ante</i> economic impact	Current	01/95	12/98
25	Environmental and socio-economic impacts of trypanosomosis control	<i>Ex ante</i> environmental impact	Current	01/95	12/01
26	Impact of trypanosomosis control in Burkina Faso, Côte d'Ivoire Ethiopia and The Gambia	<i>Ex ante</i> economic impact	Current	1995	2001
27	Assessment of local participation in tsetse control	<i>Ex ante</i> adoption	Current	1993	1998
28	Economic impacts of rinderpest control in selected countries of Africa	<i>Ex post</i> economic impact	Current	1996	1998
29	Benefits of integrating cereals and forage legumes with crossbred dairy technology	<i>Ex ante</i> economic impact	Completed	01/96	06/97

30	Adoption of trypanotolerant cattle in southern Burkina Faso	<i>Ex post</i> adoption	Completed	01/96	12/98
31	Potential returns to ILRI's smallholder dairy research	<i>Ex ante</i> economic impact	Completed	05/96	12/96
32	Potential returns to ILRI's genetics of resistance to helminthiasis research	<i>Ex ante</i> economic impact	Completed	05/96	12/96
33	Potential returns to ILRI's feed research	<i>Ex ante</i> economic impact	Completed	05/96	12/96
34	Impacts of producer milk processing groups in Ethiopia	<i>Ex post</i> economic impact	Current	09/96	10/98
35	Impacts of planted forages in West Africa	<i>Ex post</i> economic impact	Current	01/97	03/98
36	Smallholder dairy technology in coastal Kenya	<i>Ex post</i> adoption	Current	03/97	06/98
37	Adoption pathways for the broadbed maker	<i>Ex post</i> adoption	Completed	01/97	12/97
38	Potential returns to trypanosomosis vaccine research in sub-Saharan Africa	<i>Ex ante</i> economic impact	Completed	01/97	12/97
39	Decision-support systems to improve human welfare and conserve ecosystem integrity	Methodology development	Current	01/97	12/01
40	Cost of tick borne diseases of livestock in Africa, Asia and Australia	<i>Ex ante</i> economic impact	Current	05/97	05/99
41	Genetic improvement of millet and sorghum residues	<i>Ex ante</i> economic impact	Current	08/97	05/98
42	Hay making technology in southern Ethiopia	<i>Ex post</i> adoption	Current	09/97	1998
43	Economic impact of heartwater in the SADC region of Africa	<i>Ex ante</i> economic impact	Current	10/97	05/99
44	Genetic improvement of dual purpose cowpeas in West Africa	<i>Ex ante</i> economic impact	Current	11/97	09/98

45	Impact of improved management of mixed crop-livestock systems in semi arid Africa	<i>Ex ante</i> environmental impact	Current	11/97	12/98
46	Impact of the ILRI-co-ordinated Small Ruminant Research Network	<i>Ex post</i> social impact	Current	01/98	12/98
47	Impact of ILRI's graduate fellowship programme	<i>Ex post</i> social impact	Current	01/98	12/98
48	Enhancing positive impacts of livestock on the environment	<i>Ex ante</i> environmental impact	Current	01/98	12/01
49	Impact of Vertisol technology adoption in the Ethiopian highlands	<i>Ex post</i> economic impact	Proposed	04/98	12/98
50	Economic impact of disease-feed interaction based technologies in West Africa	<i>Ex ante</i> economic impact	Current	05/98	12/98
51	Cost of major livestock diseases in Latin America and the Caribbean	<i>Ex ante</i> economic impact	Proposed	06/98	05/00
52	Methods to assess the impacts of livestock technologies on household welfare	Methodology development	Proposed	06/98	06/99
53	Effect of ruminant livestock technologies on the welfare of women and children	<i>Ex post</i> social impact	Proposed	06/98	06/99

01: Impact of chemoprophylactic control of trypanosomosis in coastal Kenya

Analysis

Ex post economic impact

Dates

June 1982–October 1986

Input

P Itty, G D M d'Ieteren, J Durkin, S G A. Leak, J H H Maehl, S H Maloo, F Mukendi, S M Nagda, J M Rarieya, W Thorpe, J C M Trail (ILRI) and S Chema (Veterinary Research Laboratory, Kenya)

ILRI links

Sustainable Production Systems Programme Increasing productivity under disease risk (project 18)

Objective

To compare the benefits of prophylactic trypanocidal drug regime against chemotherapeutic (non-prophylactic) control measures in coastal Kenya

Methods

This study was done in two phases, the first from June 1982 to April 1984 for the collection of baseline data, and the second from April 1984 to October 1986 for the estimation of the effects of the prophylactic control measures for trypanosomosis. A cost-benefit analysis was done using the ILCA (now ILRI) Herd Model to compare prophylactic control using Samorin with chemotherapeutic (non-prophylactic) control using Berenil. About 700 East African Zebu cattle from 17 herds were studied in Muhaka area of Coast Province.

Findings

Cattle production in Muhaka area, where livestock are exposed to low-to-medium trypanosomosis risk, was more profitable when cattle were treated prophylactically with Samorin than when they received therapeutic treatments with Berenil. The average performance amounted to a net present value (NPV) of KSh 200,302 or US\$ 11,782 (1987 prices) and a benefit-cost ratio (B/CR) of 3.7 at 12% discount rate. Sensitivity analysis showed that the prophylactic regime was still profitable even if expenditure on the prophylactic drug was doubled. On an individual herd basis, the superiority of the prophylactic drug regime was directly related to the increase in lactation yield, the analysis indicated that the use of Samorin was profitable only above a certain level of

trypanosomosis risk The main overall difference between the non prophylactic (Berenil) and the prophylactic (Samorin) groups was in their lactation yields of 158 and 196 litres, respectively

Status

Completed

Publications

Maloo S H , Kimotho P G , Chema S , Koskey J , Trail J C M and Murray M 1985 Health and productivity of East African Zebu under village management in a tsetse-infested area on the coast of Kenya *Proceedings of the 18th Meeting of International Scientific Council for Trypanosomiasis Research and Control held in Harare, Zimbabwe, March 1985* No 113 Organization of African Unity (OAU)/ Scientific Council of Trypanosomiasis Research and Control (SCTRC), Nairobi, Kenya pp 182-186

Itty P , Chema S , d'Ieteren G D M , Durkin J , Leak S G A , Maehl J H H , Maloo S H , Mukendi F , Nagda S M , Rarieya J M , Thorpe W and Trail J C M 1988 *Livestock production in tsetse affected areas of Africa Proceedings of a Meeting held in Nairobi, Kenya, 23-27 November 1987* ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia, and ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya pp 360-388

02 Economic impact of N'Dama cattle in tsetse-affected areas of Zaire, Togo, Ethiopia and The Gambia

Analysis

Ex post economic impact

Dates

- January 1986–December 1989

Input

- G D M d'Ieteren, P Itty, G J Rowlands, J C M Trail and F van Winckel (ILRI)

ILRI links

Sustainable Production Systems Programme Increasing productivity under disease risk (project 18) in collaboration with International Trypanotolerance Centre (ITC), African Trypanotolerant Livestock Network (ATLN), Developpement Progres Populaire Idiofa, Zaire and national partners in Zaire, The Gambia, Togo and Ethiopia

Objective

To provide first hand information on the economic feasibility of introducing trypanotolerant cattle into village systems in tsetse affected areas where cattle husbandry has not been practised in the past

Methods

Herd structures and mean productivity values were derived for over 40 herds monitored monthly between January 1986 and December 1989 in Zaire, Togo, Ethiopia and The Gambia The monitoring was followed up by economic surveys and rapid rural appraisals to generate economic data and qualitative information on the livestock systems A bio-economic herd model was used to simulate costs and benefits over 10 years, at both society (economic) and individual (financial) levels The net-benefit investment ratio (NKR) and internal rate of return (IRR) were used to assess the benefits This study is the first of its kind to be based on complete economic data and recorded productivity

Findings

ZAIRE The society level economic analysis showed an overall NKR of 1.49, using a 10% discount rate, and an IRR of 18% The financial analysis of privately owned herds revealed an NKR of 1.56 and an IRR of 16% In both cases, the returns were positive but not outstanding The study showed that, in spite of reasonable cattle productivity and low inputs, economic and financial returns were limited because of a shortage of breeding cattle available for purchase in the Idiofa region and the high cost of livestock The co-operatively owned herds established through the metayage cattle

introduction scheme—animals are provided on loan but to be reimbursed in the form of offspring—resulted in substantial returns to the co-operatives (NKR 2 06, IRR 20 2%) The returns to institutionally owned herds were similarly high (NKR 2 01, IRR 25 3%)

TOGO Economic social level analysis showed fair returns (NKR 1 18, IRR 13 6%) while high returns (NKR 2 46, IRR 23 7%) were realised at the individual level due to the metayage lease scheme These results show that cattle production in Avetonou was profitable on average but the returns were sensitive to the cost of importing trypanotolerant N'Dama cattle

ETHIOPIA On average the private financial analysis yielded an NKR of 1 8–2 4 and an IRR of 12–30% Despite the high level of trypanosomiasis risk and the prevalence of drug-resistant trypanosomes, the economic returns were much higher (NKR 1 7–3 6, IRR 26–59%)

THE GAMBIA The average economic return was positive, with NKR of 1 6–3 5 and IRR of 19–46%, financial analysis yield NKR of 1 0–2 1 and IRR of 10–26%

All these findings show that the introduction of trypanotolerant cattle is economically justifiable

Status

Completed

Publications

d'Ieteren G , Itty P , Rowlands G J , Trail J C M and van Winckel F 1990 Economic evaluation of the introduction of N'Dama cattle in Idiofa region, Zaire In *ILCA (International Livestock Centre for Africa), ILCA Annual Report 1989* ILCA, Addis Ababa, Ethiopia pp 100–101

Itty P and Swallow B M 1983 The economics of trypanotolerant cattle production in regions of origin and areas of introduction In Rowlands G J and Teale A J (eds), *Towards increased use of trypanotolerance Current research and future directions Proceedings of a Workshop organized by International Laboratory for Research on Animal Diseases and the International Livestock Centre for Africa held at ILRAD, Nairobi, Kenya* ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya, and ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia pp 115–121

van Winckel F , d'Ieteren G D M , Leak S G A , Maehl J H H , Minengu M , Nagda S M , Ngamuna S , Rarieya J M , Rowlands G J , Thorpe W and Trail J C M 1989 Preliminary results of study of N'Dama cattle in a metayage system in Idiofa District, Zaire In *Proceedings of the 20th Meeting of the International Scientific Council for Trypanosomiasis Research and Control, Mombasa, Kenya, 10–14 April 1989* No 115 Organization of African Unity (OAU)/Scientific Council of Trypanosomiasis Research and Control (SCTRC), Nairobi, Kenya pp 520–522

Itty P , Rowlands G J , Minengu M , Ngamuna F , van Winckel F , and d'Ieteren G D M 1995 The economics of recently introduced village cattle production in a tsetse affected area (I) Trypanotolerant N'Dama cattle in Zaire *Agricultural Systems* 47 347–366

Itty P , Rowlands G J , Morkramer G , Defly A and d'Ieteren G D M 1995 The economics of recently introduced village cattle production in a tsetse affected area (II) Trypanotolerant cattle in Southern Togo *Agricultural Systems* 47 473-491

Itty P , Swallow B M , Rowlands G J , Woudyalew M and d'Ieteren G D M 1995 The economics of village cattle production in a tsetse-infested area of Southwest Ethiopia *Preventive Veterinary Medicine* 22 183-196

Agyemang K , Dwinger R H , Little D A. and Rowlands G J 1997 *Village N'Dama Cattle Production in West Africa Six years of research in The Gambia* ILRI (International Livestock Research Institute), Nairobi, Kenya, and ITC (International Trypanotolerance Centre), Banjul, The Gambia 131 pp

03: Adoption of dairy feeding management in the Ethiopian highlands

Analysis

Ex post adoption

Dates

1987-1992

Input

B I Shapiro, L Dadi, E Zerbinı (ILRI) and Getachew Feleke (Ministry of Agriculture, Ethiopia)

ILRI links

Sustainable Production Systems Programme Improving productivity and sustainability of crop-livestock systems in the highlands of sub-Saharan Africa and Asia (project 13), Smallholder dairy systems (project 19)

Objective

To evaluate the extent of adoption of improved management and feed production and feeding strategies and to identify the major factors affecting adoption of these interventions The low genetic potential of the indigenous zebu breed and inadequate nutrition are major causes of low livestock productivity in Ethiopia and other countries in Africa The Dairy Development Programme (DDP) was started in the Ethiopian highlands to enhance dairy production through crossbreeding and improved feeding management

Methods

Adoption data were collected in 1992 (two years after the Dairy Development Programme ended) through a cross-sectional survey of 130 smallholder dairy farmers, including spontaneous adopters (who received crossbred cows through the DDP), spontaneous rural adopters and spontaneous urban in the Selale/Debre Libanos area The data were analysed using cross-tabulation and a logit adoption model

Findings

The results showed low adoption rates for the improved feed production methods Many of the farmers had taken to feeding concentrates to their crossbred cows, enabling them to feed their crossbred cows adequately without adopting intensified forage production practices However, recommended proportions of concentrate ingredients were not adhered to and the amounts fed to crossbred cows did not correspond with productivity parameters

Contrary to an expectation that the DDP would lead to substitution of crossbreds for local stock, use of concentrates enabled farmers to increase their stocking rates and herd sizes, which they did instead of substituting more productive animals for local breeds. Introduction of crossbred cows without complementary intensified feed production also reduced the availability of forages for local stock. Some adverse impacts on grazing and sustainability of the farming systems are thus expected.

Funding

ILRI unrestricted core

Status

Completed

Publications

Shapiro B I , Dadi L , Zerbini E , and Feleke Getachew 1992 *Adoption of recommended feed production and feeding practices for crossbred cows in the Ethiopian highlands*. International Livestock Centre for Africa, Addis Ababa, Ethiopia

04: Costs and benefits of alternative theileriosis control strategies in Zimbabwe

Analysis

Ex ante economic impact

Dates

1988–1989

Input

B D Perry, R A I Norval, R L Kruska, (ILRI), U Ushewokunze Obatolu, J Barrett and S Hargreaves (Veterinary Research Laboratory, Zimbabwe)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), Sustainable Production Systems Programme Systems analysis and impact assessment (project 11)

Objective

To evaluate the costs and benefits of implementing alternative East Coast fever control strategies Regular compulsory dipping with acaricides to protect livestock against East Coast fever (ECF) has been in force in Zimbabwe since 1914 Following eradication of ECF in 1954, dipping continued, now directed against other tick-borne diseases During Zimbabwe's war of independence in the 1970s, however, the dipping services broke down, resulting in heavy losses of livestock from tick borne diseases Since independence, there has been a steady resumption of compulsory dipping in the country's communal lands, with the services being supported entirely by the government at a high cost (About Z\$ 18,489,000 was expended for the financial year 1988–1989) Alternative control strategies have been proposed these make less intensive use of expensive acaricides and rely predominantly on controlled immunisation and development of natural immunity to tick borne diseases

Methods

An *ex ante* evaluation of alternative control strategies was conducted on target cattle populations in four zones in the communal lands The three alternative strategies were (a) reduced dipping, involving fortnightly dipping during the summer months and monthly dipping during the rest of the year (equivalent to 21 acaricide immersions annually), (b) a combination of strategic dipping (weekly dipping during the summer months, equivalent to 12 acaricide immersions), supplemented by natural or artificially induced herd immunity to tick borne diseases, and (c) minimal dipping (equivalent to 4 acaricide immersions annually) Expenses (acaricides, personnel costs, facilities and overheads) of each strategy were evaluated and projected over a 20 year period using a computer spreadsheet model

Findings

Both the reduced (Strategy A) and the strategic minimal (Strategy B) dipping strategies were found to be more cost effective than the current practice of intensive dipping. They represent a total present value cost saving of Z\$ 15-20 million at a 10% discount rate, over a 20 year period. The strategies potentially could reduce the cost of tick and tick borne disease control in present value terms (at a 10% discount rate) by 46% for reduced dipping (from Z\$ 2.50 to Z\$ 1.35 per animal per year) and by 68% strategic minimal dipping (from Z\$ 2.50 to Z\$ 0.81 per animal per year).

Status

The study is complete. Technical, epidemiological, production, policy and land use implications of the alternative strategies were laid out in a report to Zimbabwe's Director for Veterinary Services, together with six recommendations for further study.

Funding

ILRI unrestricted core

Publications

Norval R A I, Perry B D, and Hargreaves S K 1992 Tick borne disease control in Zimbabwe: what might the future hold? *Zimbabwe Veterinary Journal* 23: 1-15

Perry B D, Ushewokunze-Obatolu U, Hargreaves S and Kruska R 1990 Assessment of the impact of current and alternative tick and tick borne disease control strategies at a national level in Zimbabwe. *ILRAD Annual Scientific Report 1990*. ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya. p. 85

Perry B D, Mukhebi A W, Norval R A I and Barrett J C 1990 A preliminary assessment of current and alternative tick and tick borne disease control strategies in Zimbabwe. Report to the Director for Veterinary Service (Zimbabwe). ILRI (International Livestock Research Institute), Nairobi, Kenya. 41 pp

05. Impacts of East Coast fever immunisation in coastal and highland Kenya

Analysis

Ex ante economic impact

Dates

1988–1994

Input

A W Mukhebi, B D Perry, A S Young, J M Delehanty, W Thorpe, E Mussukuya and S Mining (ILRI)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7)

Objectives

To evaluate the economic viability of immunisation against East Coast fever and to assess its potential impact in dairy production systems in two regions of Kenya. East Coast fever is controlled by frequent application of acaricides, in areas of heavy tick infestation, cattle are treated with acaricides as often as twice weekly. This method of control is becoming unreliable in many areas due to the high cost of acaricides, poor maintenance of dips or spray races, water shortages, tick resistance to acaricides, illegal cattle movements, contamination of the environment or food with toxic residues, and the availability of alternative (mainly ungulate) hosts. Although demand for dairy products in Kenya is high and rising, attempts to improve dairy production have been severely constrained by ECF and other tick borne diseases. It is believed that immunisation against ECF would decrease both the risk of the disease and reliance on use of pesticides, thereby increasing productivity.

Methods

The Kenya Agricultural Research Institute (KARI) and ILRI determined the efficacy of immunisation against ECF by the infection-and-treatment method in coastal Kenya and in the Uasin Gishu highlands. They employed farm spreadsheet models for the financial analysis, using cattle production data from farm household surveys. The annual economic cost of ECF immunisation was computed and the model was run to generate indicators of economic viability such as cost-benefit ratios and break even cost of immunisation under a variety of disease control scenarios, ranging from the current control strategy to immunisation with 25–100% reduction in acaricide use.

Findings

Results indicate that immunising cattle against ECF at the Kenya coast would reduce economic losses by 24–40% in indigenous zebu cattle populations and by 40–70% in genetically improved grade cattle. The immunisation would yield increases in net income of 24–103%, depending on the alternative control strategy employed. On the basis of cost-benefit ratio, immunisation at a cost of KSh 544 (US\$ 25) per animal (in 1990 values) would be financially profitable in grade but not in zebu cattle. For the new strategies to be as financially profitable as the current strategy for zebu, the cost of immunisation would have to be in the range of KSh 230–415 per animal, or the farm gate price of milk would have to increase by at least 80%. The model estimates the annual target cattle population for immunisation at 14,500 in Kaloleni, costing an estimated KSh 8 million.

Status

Completed

Funding

ILRI unrestricted core

Publications

- Delehanty J 1993 Spatial projection of socio economic data using geographic information systems results from a Kenya study in the strategic implementation of a livestock disease control intervention. In Dvorak K A (ed), *Social Science Research for Agricultural Technology Dimensions Proceedings of an International Institute of Tropical Agriculture (IITA) and Rockefeller Foundation Workshop, 2–5 October 1990 Ibadan, Nigeria*. CAB International, Wallingford, UK pp 37–50
- Mukhebi A W, Morzaria S P and Perry B D 1989 Economics of an East Coast fever immunisation trial at the Kenyan coast. In Dolan T T (ed), *Theileriosis in Eastern, Central and Southern Africa Proceedings of a Workshop Held in Lilongwe, Malawi, 20–22 September 1988*. ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya pp 60–61
- Mukhebi A W, Perry B D, Delehanty J M, Thorpe W and Mussukuya E 1990 Farm level financial and economic impacts of the current and alternative East Coast fever control strategies in Kilifi and Uasin Gishu Districts of Kenya. *ILRAD Annual Scientific Report 1990*. ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya pp 81–82
- Mukhebi A W, Mussukuya E, Mullins G, Kariuki D P, Ngumi P N, Thorpe W and Perry B D 1995 Assessing economic impacts of East Coast fever immunization: a case study in Coast Province, Kenya. *Veterinary Record* 137 17–22
- Nyangito H O, Richardson J W, Mukhebi A W, Mundy D S, Zimmel P, Namken J and Perry B D 1994 Whole farm economic analysis of East Coast fever immunisation strategies in Kilifi District, Kenya. *Preventive Veterinary Medicine* 21 215–235

- Nyangito H O , Richardson J W , Mukhebi A.W , Mundy D S , Zimmel P and Namken J 1994 Whole-farm economic analysis of East Coast fever immunisation strategies on farms in the Uasin Gishu District of Kenya *Computers and Electronics in Agriculture* 12 19-33
- Nyangito H O , Richardson J W , Mukhebi A.W , Mundy D S , Zimmel P , Namken J and Perry B D 1994 Whole farm simulation analysis of East Coast fever immunisation strategies on mixed crop-livestock farms in Kenya *Agricultural Systems* 51 1-27
- Van Schaik G , Perry B D , Mukhebi A W , Gitau G K. and Dijkhuizen A A 1996 An economic study of smallholder dairy farms in Murang'a District, Kenya. *Preventive Veterinary Medicine* 29 21-36

06: Fodder bank adoption in northern Nigeria

Analysis

Ex post adoption

Dates

1989–1995

Input

B Hassane, R von Kaufmann and B Norton (ILRI)

ILRI links

Sustainable Production Systems Programme Improving crop–livestock systems in subhumid sub Saharan Africa and Asia (project 14)

Objective

To evaluate fodder banks of planted *Stylosanthes hamata* to determine factors influencing their adoption

Methods

Thirty fodder banks spread over six states and across subhumid and semi arid ecological zones were studied Biological and socio-economic data were gathered from 1989–1991 through interviews with 94 adopters and non adopters and 44 extension staff An adapted multiple-choice questionnaire was used in which respondents provided quantitative values for each answer, with the total choices summing to 10 regardless of the number of alternatives selected

Findings

A total of 716 fodder banks had been established in the study area by 1991 The surveys showed that the fodder bank package has become a successful innovation among agro-pastoralists in northern Nigeria Signs that agro-pastoralists recognise the value of fodder banks can be seen in the curve of adoption, positive response to the National Livestock Projects Division extension programme and the emergence of an independent market for stylo seed harvested from fodder banks Agro-pastoralists with fodder banks believed that the extension effort *per se* was the principal constraint to adoption (score of 4.5 out of 10), followed by shortage of suitable land and labour Non-adopters considered land ownership to be the main constraint to adoption, followed by financial resources and then labour Non adopters were constrained by customary rights in their applications to participate in fodder bank implementation, whereas those who had acquired land through the local authority were not Extension agents perceived farm area and tenure arrangements of occupied land as the principal factors influencing the adoption of fodder bank technology They ranked the effectiveness of their own extension programme as the next most

important constraint Within the extension system, lack of mobility was cited as the main constraint to effective operation

Status

Completed

Funding

ILRI unrestricted core

Publications

Hassane B 1995 *On farm evaluation of fodder bank adoption among agro-pastoralists in northern Nigeria*
PhD thesis, Utah State University, USA 170 pp

von Kaufmann R and Hassane B 1989 Multi locational testing of fodder banks in the subhumid zone *ILCA Annual Report 1989*, ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia pp 14-16

07 Impact of land tenure on adoption of alley farming in West Africa

Analysis

Ex post social impact

Dates

1989–1992

Input

S Lawry, D Stienbarger (Land Tenure Center, University of Wisconsin–Madison), Y L Fabiyi, E Idowu, K Ogunbameru, B Adedoja (Obafemi Awolowo University, Ile Ife, Nigeria), M Foli, K Kpakote, K Kenkou, K Agbemelo-Tsomafo (Université du Bénin, Togo), J Tonye, P Titi-Nwell, C Meke-Meze (Institute de la Recherche Agronomique, Yaounde, Cameroon) and M A Jabbar (ILRI)

ILRI links

Sustainable Production System Programme Improving crop–livestock systems in subhumid sub Saharan Africa and Asia (project 14), in collaboration with the Land Tenure Center, University of Wisconsin–Madison, and national partners in Cameroon, Nigeria and Togo

Objectives

To determine whether the areas in which alley farming had been tested were representative of all suitable areas and what types of land tenure favour or hinder the adoption of alley farming The International Institute of Tropical Agriculture, based in Ibadan, Nigeria, developed alley cropping to improve soil fertility, to control soil degradation and to increase crop yields Leguminous trees are planted in rows and tree foliage is used as mulch to grow crops in the alleys Alley cropping is believed to eliminate or reduce the need for fallowing to restore soil fertility ILRI conducted agronomic and animal nutrition experiments for several years to assess the utility of modifying alley cropping so that part of the tree foliage is used as protein rich feed for animals to increase productivity of both crop and livestock production, this modified system was termed ‘alley farming’ ILRI also conducted on farm research in selected sites in Nigeria to assess the adaptability and adoptability of alley farming

Methods

A literature review was conducted to characterise the evolution of land tenure systems in West Africa This was followed by a detailed study of the general land tenure characteristics in Nigeria, Cameroon and Togo The information gathered was used to predict, on an a priori theoretical basis, whether existing land tenure systems favour adoption of alley farming A survey was subsequently conducted in 1990–91 among a sample of 2305 households in the three countries,

the sample included both non adopters and adopters of alley farming. Adopters included those who, at the time of the survey, had discontinued using alley farming and those who were still using it.

Findings

The study showed that in Nigeria, Cameroon and Togo, 66, 54 and 36% of the land, respectively, was under tenure systems that provided long term security and was therefore favourable for adoption of alley farming. Existing land fertility management practices, such as application of chemical fertilisers and tree planting, also indicated that long term access to benefits encouraged better soil and tree management, a condition equally applicable to alley farming. In Nigeria, where on farm tests were extensively done, the adoption, maintenance and continued use of alley farming was associated with security of tenure. These results suggest that land tenure had a significant role in the adoption, continuation and discontinuation of alley farming and that in West Africa a significant proportion of land was held under tenure systems that are favourable for adoption of alley farming.

Status

Completed

Funding

ILRI unrestricted core and United States Agency for International Development.

Publications

- Fabiyi Y L , Idowu E , Ogunbameru K and Adedoja B 1991 *The implications of land and tree tenure for the introduction of alley farming in southern Nigeria*. An interim report submitted to International Livestock Centre for Africa by Land Tenure Centre, University of Wisconsin-Madison, Wisconsin, USA 70 pp
- Lawry S W and Stienbarger D 1991 *Tenure and alley farming in the humid zone of West Africa. Final report of research in Cameroon, Nigeria and Togo*. LTC Paper No 105 Land Tenure Center, University of Wisconsin-Madison, Wisconsin, USA 63 pp
- Lawry S , Stienbarger D and Jabbar M A 1994 Land tenure and the potential for the adoption of alley farming in West Africa. *Outlook on Agriculture* 23 (3) 183-187
- Stienbarger D 1990 Land tenure and alley farming a literature review with particular reference to the West African humid zone. LTC Paper No 138 Land Tenure Center, University of Wisconsin-Madison, Wisconsin, USA, and ILCA (International Livestock Centre for Africa), Ibadan, Nigeria 36 pp
- Stienbarger D 1990 *Regime foncier et agriculture en coulours compte rendu des publications avec une reference speciale a la zone humide d'Afrique occidentale*. Land Tenure Center, University of Wisconsin-Madison, Wisconsin, USA, and ILCA (International Livestock Centre for Africa), Ibadan, Nigeria 40 pp

08: Impact of crossbred dairy–draft technology in Ethiopia

Analysis

Ex ante economic impact

Dates

January 1989–December 1998

Input

Azage Tegegne, B I Shapiro, M A Mohamed Saleem, Genet Assefa (ILRI), Alemu Gebrewold, , Z Sileshi, T Kumsa, Y Shiferaw (Ethiopian Institute of Agricultural Research), J Haider, T Demisse (Ethiopian Health and Nutrition Research Institute, EHNRI) and Mengistu Alemayehu (Alemaya University of Agriculture)

ILRI links

Sustainable Production Systems Programme Improving crop–livestock systems in the highlands of sub-Saharan Africa and Asia (project 13), Alternative sources of draft animals use of crossbred dairy cows for traction (subproject E04)

Objective

To assess the impact of dairy–traction technology and improved management practices on farm economics, household nutrition and health and key factors affecting long term adoption of dairy–traction technology Use of cows for both milk production and draft work could benefit total on-farm animal production in tropical countries of Africa and Asia by alleviating the need to maintain draft oxen year round and a follower herd to supply the replacement oxen Fewer but more efficient multi purpose animals could reduce stocking rates and overgrazing and contribute to more sustainable farming systems Dairy cow-traction technologies are new in Africa and therefore need to be evaluated in a whole farm context

Methods

On-farm studies started in 1993 with 14 pilot farmers selected from peasant associations in the Holetta, Ethiopia, area Each farmer was supplied with a pair of crossbred cows Half the farmers used their cows for dairy–draft, the other half used them for dairying only In 1995, 60 more farmers representing three economic groups—relatively rich, middle income and poor—were recruited to the project and each also given a pair of crossbred cows for dairy–draft use Another 60 farmers who practise traditional oxen traction were used as a control group Improved management practices for keeping crossbred cows were introduced in the study area (using oat/vetch as forage, planting fodder crops and multi-purpose trees in farmers' back yards and constructing improved barns) Detailed farm level data were collected daily on each of the 134 farms during 1997 Anthropometric measurements (weight for height, weight for age and height for age) of women

and pre school children were taken in all households to analyse the impacts of introducing crossbred cows on intra household nutrition and health. Whole farm evaluation of the dairy-draft technologies, including complementary feed production and management practices, was carried out to determine the *ex ante* potential for adoption under different resource-endowment conditions. Farmers who received crossbred cows were divided into a dairy-draft group that used the cows for milk and traction and a dairy only group that used the cows for milk production only. These models were compared with another developed for traditional practice.

Findings

Crossbred cows were found to be 19% more efficient than local oxen in terms of time efficiency of plowing. This suggests that the dairy-draft technology can help reduce animal power constraints on farms, facilitating seed-bed preparation and a more profitable crop mix, leading to higher farm income. An *ex ante* impact assessment showed the incremental benefit-cost ratio of using crossbred cows for both dairying and draft work to be about 3.5 times as opposed to using them for dairy only. The financial savings from not having to keep oxen and followers for draft use led to substantial savings from using crossbred cows for both dairy and traction, despite the additional investments involved. Introducing of a pair of crossbred cows for milk production only into a traditional farming system increases farm gross margins by 41% (from EB 9,379 to EB 13,223). Using the same crossbred cows for both milk and traction raises the gross margins by 5% (to EB 13,845) over the dairy-only farm plan.

Results show that introducing crossbred cows can improve human health and nutritional status. Adoption of dairying with crossbred cows increases food availability, making it a potential means of achieving food security. Among adopters of crossbred cow technologies there was a lower prevalence of stunting (height for age) (31%) than in western Shoa (60%), where the project is located, and rural Ethiopia (64%) in general. Furthermore, the reduction in stunting appears to be related to increased income from dairying rather than reduction in infectious disease. In spite of all this, farmers have been wary of adopting the use of crossbred cows for cultivation. The system is likely to be more attractive to small and medium sized farmers than to land-rich farmers because as landholdings decrease in size so too do feed resources available to farmers and the marginal benefit of using crossbred cows for cultivation is relatively greater.

Difficulty in obtaining concentrates is a major constraint on use of crossbred cows on both dairy only and dairy-draft farms. The model indicates that substitution of concentrates by oat/vetch hay produced on farm will not take place until the price of concentrates rises by 50%. Most farmers will not adopt dairy-draft cows until they can be assured of considerable support to overcome the risk of using high value cows for traction. Diffusion will be slow unless adequate infrastructure, extension and technical support services are established.

Status

The study is in its final stage of assessing the impacts of dairying on food security.

Funding

ILRI unrestricted core

Publications

ILRI (International Livestock Research Institute) 1998 *Alternative sources of draft power Use of crossbred dairy cows for milk production and traction ILRI Annual Project Progress Report 1997* pp 178-184

Mengistu Alemayehu 1997 *Comparative work performance of oxen and crossbred cows in smallholder farms in Ethiopia* MSc thesis, Alemaya University of Agriculture, Alemaya, Ethiopia 146 pp

09• Impact of livestock on alley farming systems in West Africa

Analysis

Ex ante economic impact

Dates

1994–1996

Input

S Ehui and M A Jabbar (ILRI)

ILRI links

Sustainable Production Systems Programme Policy analysis of crop–livestock systems (project 12), Improving crop–livestock systems in the highlands of sub Saharan Africa and Asia (project 13), Improving crop–livestock systems in subhumid sub Saharan Africa and Asia (project 14)

Objective

To determine whether inclusion of animals in alley cropping systems increases system productivity and sustainability The International Institute of Tropical Agriculture based in Ibadan, Nigeria, developed alley cropping to improve soil fertility, to control soil degradation and to increase crop yields Leguminous trees are planted in rows and tree foliage is used as mulch to grow crops in the alleys Alley cropping is believed to eliminate or reduce the need for fallowing to restore soil fertility ILRI conducted agronomic and animal nutrition experiments for several years to assess the utility of modifying alley cropping so that part of the tree foliage is used as protein rich feed for animals to increase productivity of both crop and livestock production, this modified system was termed ‘alley farming’

Methods

Data on three production systems in Nigeria—non-alley farming with short fallow (traditional bush fallow system), continuous alley farming and alley farming with short fallow—covering eight years were analysed The Total Factor Productivity (TFP) indices were used to determine the spatial and temporal differences in input/output quality and quantity and resource flows and stocks The interspatial TFP index measures the efficiency with which resources are employed in the production process (economic viability) at a given period, while the intertemporal TFP is about the productive capacity of a system over time (sustainability)

Findings

The alley farming systems were relatively more productive than the traditional bush fallow system The estimated interspatial TFP (economic viability) measures are largely greater than one, indicating that the two alley farming systems produced comparatively more output than the traditional bush

fallow system. Total factor productivity levels doubled when livestock were added to the system. Moreover, continuous alley farming appeared to be sustainable and economically more efficient over time than the traditional bush fallow system. Alley farming with fallow appeared to be economically more efficient (i.e. more output for a given bundle of input) than the bush fallow system but was not sustainable because of loss of output during fallow periods.

Status

Completed

Funding

ILRI unrestricted core

Publications

Ehui S K and Jabbar M A 1994 Measuring the sustainability of crop-livestock systems in sub-Saharan Africa. Methods and data requirements. In Powell J M, Fernandez-Rivera S, Williams T O and Renard C (eds), *Livestock and Sustainable Nutrient Cycling in Mixed Farming Systems of Sub-Saharan Africa. Volume II. Technical Papers. Proceedings of an International Conference held in Addis Ababa, Ethiopia, 22-26 November 1993*. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia pp 453-460

Ehui S K and Jabbar M A 1997 A framework for evaluating the sustainability and economic viability of crop-livestock systems in sub-Saharan Africa. In Rose R, Tanner C and Bellamy M A (eds), *Issues in Agricultural Competitiveness, Markets and Policies. IAAE Occasional Paper No 7. Proceedings of the 22nd Conference of International Association of Agricultural Economists, Harare, Zimbabwe, 22-29 August, 1994*. Dartmouth Publishing Co, London, UK pp 406-414

10• Impact of dairy intensification on African peri-urban milk production systems

Analysis

Ex ante economic impact

Dates

January 1990–December 1998

Input

A Lahlou-Kassi, Azage Tegegne, B Rey, E Mukasa Mugerwa, E Zerbini, B I Shapiro (ILRI), Tesfu Kassa, Abraham Gelato, Gemechu Wirtu (Addis Ababa University), Alemu Yami, Mekonnen Haile Mariam (Alemaya University of Agriculture, Ethiopia), J M Le Horgne and B Faye (CIRAD EMVT, France)

ILRI links

Sustainable Production Systems Programme Smallholder dairy systems (project 19), Market-oriented smallholder dairying (subproject E37Z)

Objectives

To compare the importance of diseases of intensification and major epidemic diseases on peri urban dairy farms, to develop methodologies and models to investigate the biological and economic impact of these diseases on milk production, to better understand the epidemiology of, and risk factors associated with, diseases of intensification, and to evaluate cost and benefits of alternative control measures for diseases of intensification

Methods

Methodologies to examine the impact of diseases of intensification on milk production have not been well developed in Africa. Farmers' perceptions of the diseases of intensification of dairy production were determined in the Addis Ababa milk shed using questionnaires given to farmers in three urban dairy production subsystems. A representative sample of 2735 dairy cows was drawn from these subsystems for comprehensive study. A cross-sectional survey was conducted to collect data on farm resources and characteristics of each animal selected (cow identification, breed, lactation and pregnancy status, last calving date, milk yield, calf weaning age, and pre weaning calf mortality). Cows were clinically examined for lameness and the udder and teats were checked for any abnormality. Milk samples were tested by the California Mastitis Test.

Findings

Three distinct farm clusters were identified based on genotype, herd size, number of cows and type of housing. The percentage of crossbred animals was 7% in cluster 1, 12% in cluster 2 and 91%

in cluster 3, the percentage of farms with proper animal housing was 29%, 19% and 88%, and the mean herd size 4 (including 1 cow), 10 (3 cows) and 28 (14 cows), respectively. Lactating cows were 74%, 53% and 77% of the herd in clusters 1 to 3 and the proportions of pregnant cows were 23%, 33% and 43%, respectively. Subclinical mastitis increased from 17% in cluster 1 to 39% in cluster 3. Similarly, the proportion of cows with one lame leg increased from 0.2% to 7.1%. Pre-weaning calf mortality ranged from 5% in cluster 1 to 15% in cluster 3. Average milk yield was 2.0, 2.2 and 8.8 litres per day in clusters 1 to 3. Overall, the findings show that the proportion of pregnant cows, the mean incidence of blocked teats, subclinical mastitis and lameness, calf mortality and daily milk yield were highest in the most intensive production system, cluster 3.

Status

The study is continuing. The remaining task is to determine relationships between farm characteristics and incidence of diseases. The costs and benefits of different disease control measures are being examined.

Funding

Publications

Debrah S, Sissoko K and Soumare S. 1995. Etude économique de la production laitière dans la zone périurbaine de Bamako au Mali. *Revue d'Élevage et de Médecine Vétérinaire des Pays Tropicaux* 48 (1) 101-109.

Lahlou Kassı A, Rey B and Faye B. 1994. Maladies d'élevage dans les systèmes laitiers périurbains d'Afrique sub-saharienne. l'approche du CIPEA. *Veterinary Research* 25 331-337.

11: Constraints to use of animal traction in semi-arid West Africa

Analysis

Ex post adoption

Dates

January 1991–December 1992

Input

T O Williams (ILRI)

ILRI links

Sustainable Production Systems Programme Improving crop–livestock systems in semi arid sub-Saharan Africa and Asia (project 15)

Objective

To determine reasons for use, non use and abandonment of animal traction in parts of semi-arid West Africa and conditions that would increase adoption and profitable use of animal traction. The use of animal draft power for soil tillage has long been a major theme of agricultural development programmes in semi arid West Africa. The rationale for animal traction ranges from increasing agricultural productivity and income to relieving the drudgery in farm work. Yet its adoption remains low and localised.

Methods

A literature review was conducted to identify the pattern of animal traction adoption in countries in semi-arid West Africa. Farm surveys were conducted in two villages representative of two major agroclimatic zones in Niger. Regression analysis was used to measure the effects of animal traction on resource use and farm productivity, while multi year partial budget streams were estimated to determine the profitability of animal traction under different utilisation scenarios.

Findings

There is a wide regional variation in the potential for adoption and efficient use of animal traction—a point generally overlooked by governments and non governmental organisations. In one study village, for example, investment in animal traction yielded a negative rate of return, resulting in a financial loss of about US\$ 300 per farmer over a five year period. A range of agro-ecological and economic factors (e.g. shortness of the growing season, poor soil fertility, limited range of crops that can be grown, high cost of draft animals and equipment) contributed to the dismal performance of animal traction in this case. In contrast, in the other study village, where agro-ecological conditions were better, a positive rate of return (17%) was observed under existing practices and profitability increased significantly (up to 58%) with an increase in the area cultivated.

with animal traction and a switch in the cropping pattern from subsistence crops (millet and sorghum) to cash crops (cowpea and groundnut) This implies that animal traction should be promoted only in areas where agro-ecological and economic conditions permit its intensive use and a wide range of tillage operations

Status

Completed

Funding

ILRI unrestricted core

Publication

Williams T O 1997 Problems and prospects in the utilization of animal traction in semi arid West Africa evidence from Niger *Soil and Tillage Research* 42 295-311

12: Impacts of dairy intensification on nutrition and health in coastal Kenya

Analysis

Ex post social impact

Date

1991

Input

R Huss Ashmore, J J Curry, A W Mukhebi and B D Perry (ILRI)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7)

Objective

To assess the impacts of dairy intensification on human nutritional status and health in Kwale and Kilifi Districts, Kenya The nutritional effect of increased livestock production remains essentially unexplored, because domestic livestock are an integral part of many African production systems, it is important to understand the nutritional significance of changes in those systems

Methods

This study derived its data from three detailed nutrition studies in 779 households conducted between July 1985 and July 1987 by the Food and Nutrition Studies Program of the Ministry of Planning and National Development/Ministry of Health The potential nutritional benefits of intensification of dairying were estimated using these data and data from a National Dairy Development Programme (NDDP) study The nutritional studies incorporated longitudinal surveys to measure food intake and nutritional status for a representative sample of the general rural population, settlement scheme farmers and NDDP contact farmers of Kilifi and Kwale districts at different points in the year Anthropometric data and clinical assessment were used to assess the nutritional status of children Points of articulation between the livestock and nutritional systems in farm households included income, resource allocation, food consumption and human disease risk

Findings

The potential nutritional impact of increased livestock production depends on whether milk is consumed directly by a household or is sold to buy other commodities The nutritional importance of milk for dairying households on the coast lies not only in its caloric content but also in its ability to supplement a primarily vegetable based diet In particular, milk contributes important amounts of essential amino acids, fat, vitamin A and calcium, which are lacking in many African diets and

which are especially important for children. For households without cows, an increase in intensive dairy production might have some economic impact through provision of employment opportunities. However, increased smallholder dairying is most likely to affect the nutritional status of these households by reducing the consumer price of milk.

Status

Completed

Funding

ILRI unrestricted core

Publications

Curry J J , Huss Ashmore R A Perry B D and Mukhebi, A W 1996 A framework for the analysis of gender, intra household dynamics and livestock disease control, with examples from Uasin Gishu District, Kenya *Journal of Human Ecology* 24 161-189

Huss Ashmore R 1992 *Nutritional impacts of intensified dairy production an assessment in Coast Province, Kenya* ILRAD Technical Report No 1 ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya 35 pp

Huss Ashmore R , Curry J J and Mukhebi A W 1991 Nutritional impact of livestock disease control *ILRAD Annual Scientific Report 1991* ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya pp 86-87

ILRAD (International Laboratory for Research on Animal Diseases) 1994 Human nutritional status as a measure of the impact of livestock disease control *ILRAD Reports* 12(1-2) ILRAD, Nairobi, Kenya

13: Economic impact of theileriosis and its control in Africa

Analysis

Ex ante economic impact

Dates

1991–1993

Input

A W Mukhebi, J Curry, B D Perry, R S Reid, W Thorpe (ILRI), R C Laker (Animal Health Research Centre, Entebbe), D Onchoke (University of Nairobi), Z Hassan (Ministry of Agriculture, Livestock and Natural Resources, Zanzibar), D Kariuki (Kenya Agricultural Research Institute), T Munyombwe and U Ushewokunze Obatolu (Zimbabwe Veterinary Research Laboratory)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7)

Objectives

To estimate the direct economic cost of theileriosis and to assess the potential benefits and costs of implementing alternative theileriosis control strategies

Methods

A computer spreadsheet model was developed and used to estimate the direct economic cost of (or losses caused by) theileriosis in 11 countries affected by the disease. Geographic Information System model was used to estimate the number of cattle under risk of theileriosis. The assessment of the economics of the alternative control strategies was based on five case studies conducted in Kenya, Tanzania, Uganda and Zimbabwe between 1991 and 1993. The benefit-cost ratio was used to compare the viability of the alternative strategies with that of the traditional method employing acaricide application.

Findings

The Geographic Information System model estimated that in the 11 countries affected by theileriosis in eastern, central and southern Africa, about 24 million head of cattle are at risk from the disease annually. This, according to the herd model, translates to a direct economic loss of at least US\$ 168 million (calculated for 1989). The actual economic losses are considerably larger than the direct losses when the indirect costs of the disease are taken into account. The *ex ante* assessment of the infection and-treatment method showed that immunisation at a cost of US\$ 2.50 per animal would increase total net income from cattle production by US\$ 133–US\$ 307 million per year and yield a benefit-cost ratio in the range of 9–17, assuming a 0–50% reduction in acaricide

use following immunisation. Break even immunisation cost ranged from US\$ 4.96 with no change in acaricide use following immunisation to US\$ 8.22 with a 50% reduction in acaricide use. The estimated annual target cattle population for immunisation in the whole region was seven million head, at a cost of US\$ 18 million. In all these studies, immunisation against theileriosis was evaluated against the current control strategy based on acaricide application. Various levels of reduction in acaricide use ranging from 0–100% following immunisation were assessed. Immunisation at a cost ranging from US\$ 4 to US\$ 25 in the different study sites with 75% reduction in acaricide use yielded the best economic results at the various sites. The annual economic cost per animal in the different study sites varied from US\$ 5 to US\$ 14 in indigenous cattle and from US\$ 11 to US\$ 105 in crossbred (including taurine) cattle under the current control strategies. An immunisation-based control strategy would reduce the economic cost of the disease by an estimated 43% in the whole region. In the various study sites, the cost would decline by 20–67% in indigenous cattle and 34–82% in the crosses.

Status

Completed

Funding

ILRI unrestricted core

Publications

- Laker C D , Mukhebi A W , Ssenyonga G S Z , Gathuma J M , Ssentongo Y K and Otim C P 1994. A financial analysis of East Coast fever immunization in Mbarara District, Uganda. *Kenya Veterinarian* 18, Special Issue, pp 242–243
- Mukhebi A W , Morzaria S P , Perry B D , Dolan T T , Norval R A I 1990. Cost analysis of immunization of East Coast fever by the infection and treatment method. *Preventive Veterinary Medicine* 9 207–219
- Mukhebi A W 1992. Economic impact of theileriosis and its control in Africa. In Norval R A I , Perry B D and Young A S (eds), *The Epidemiology of Theileriosis in Africa*. Academic Press, London, UK pp 379–403
- Mukhebi A W and Perry B D 1992. Economic implications of the control of East Coast fever in eastern, central and southern Africa. In *Proceedings of a Workshop on the Future of Livestock Industries in Eastern and Southern Africa, Harare, Zimbabwe, 19–24 July 1992*. International Livestock Centre for Africa, Addis Ababa, Ethiopia pp 107–112
- Mukhebi A W , Perry B D and Kruska R 1992. Estimated economics of theileriosis control in Africa. *Preventive Veterinary Medicine* 12 73–85

Mukhebi A W , Perry B D , Laker C D , Onchoke D G , Munyombe T and Hassan Z S 1994
Comparative regional assessment of the economic impact of theileriosis and its control in Africa
Kenya Veterinarian 18, Special Issue, pp 239-241

Okello Onen J , Mukhebi A W , Tukahirwa E M , Musisi G , Bode E , Heinonen R and Perry B D
1997 Financial analysis of dipping strategies to control tick borne diseases in indigenous cattle
under ranch conditions in Uganda *Preventive Veterinary Medicine* 33 241-250

14 Milk production potential of crossbred cows in the Ethiopian highlands

Analysis

Ex ante economic impact

Dates

March 1992–December 1997

Input

B I Shapiro, E Zerbini, I Darnhofer, Abebe Misgina (ILRI), Getachew Feleke, Abayneh Ababu (Ethiopia Ministry of Agriculture) and Smallholder Dairy Development Project team

ILRI links

Sustainable Production Systems Research Smallholder dairy systems (project 19), Improving crop–livestock systems in the highlands of sub-Saharan Africa and Asia (project 13), Market-oriented smallholder dairy (subproject E34A)

Objectives

To determine the socio economic factors that influence dairy productivity and income, to determine the factors that affect adoption of potential feeding and management technologies by farmers and to develop a whole-farm model for assessing the viability and adoption potential of feed technologies in mixed crop–livestock systems

Methods

This study was a composite of biophysical and socio economic investigations. One socio-economic study focussed on modelling adoption of improved technology by farmers using Hierarchical Decision Modelling and the Classification and Regression Tree. A mixed integer linear programming model was used to examine the potential economic impacts of crossbred cows and complementary technologies such as improved feeds.

Findings

Results indicated that farmers perceived non availability of seed and lack of extension as reasons for not adopting farm grown forage. Small farm size in relation to herd size and low land productivity were other factors explaining non-adoption of farm grown forages. It was also shown that the returns to women's labour in butter making and household cash income can be increased through introduction of an improved butter churn (the ILRI internal agitator) that halves the time it takes women to make butter. Results showed that the use of an improved churn increases returns to women's labour from EB 1.5/hour to EB 2.1/hour and increases cash income by 8%.

Status

These studies are essentially complete. This project will be subsumed in 1998 under ILRI project 13 (subproject E04A)

Funding

ILRI unrestricted core and World Food Programme

15. A rapid adoption assessment of Vertisol technology

Analysis

Ex post adoption

Dates

May–June 1992

Input

J C McCann (Boston University), M A Mohamed Saleem, Abate Tedla, Abiye Astatke and Getachew Asamenew (ILRI)

ILRI links

Sustainable Production Systems Programme Improving productivity and sustainability of crop–livestock systems in the highlands of sub Saharan Africa and Asia (Project 13), Feed utilisation improvement for increased livestock productivity (Project 8)

Objectives

To study the impediments to adoption of the improved Vertisol management technology, to identify potential changes brought by the technology to the farming community and to understand farmers' perceptions of the technology, especially the use of the broadbed maker (BBM) in the project sites

Methods

Field visits were undertaken to conduct interviews with farmers and discussions with district level agents of the Ministry of Agriculture These were preceded by a review of data, field reports and documents available at the International Livestock Centre for Africa District-level data and life history interviews with farmers provided baseline information on demography, local cropping patterns, crop mix and social property practice of farmers who participated in the project The farmer-interviews focussed on the nature and extent of their understanding of the conceptual basis of the project Interviews with district officials provided a point of comparison between district and project level planning and farmer experience of the project

Findings

At the regional level, the response to the BBM package was found to be strongest in areas that exhibit signs of intensification of land use in 'closed' systems, characterised by decreasing size of land holdings, shortage of forage resources and easy access to urban markets Farmers who have access only to Vertisols exhibit stronger adoption patterns than those who have holdings with both black and red soils Farmers with both black and red soils also stagger the timing of farm operations and maintain more diverse crop mixes than those with only Vertisols There was indication that

BBM adoption may be affected by the amount and reliability of rainfall, since seedbed preparation requires early rains. For closed systems where broadbeds and/or teff production dominate, the BBM package provides a means of increasing labour productivity.

At the local level, the BBM equipment is easily shared by farmers and patterns of sharing reflect the relationships already used in plough sharing and co-operative labour. Co-operation in BBM-sharing groups is usually among households with similar endowments of oxen and family labour. Resource-poor farms are unlikely to adopt BBM technology and to be accepted into resource-rich BBM-sharing groups. Short term adoption rates may be somewhat higher than long term rates since some farmers may adopt the BBM so as to gain access to fertiliser and improved seeds. Local agricultural agencies (such as the Joint Vertisol Project and the Ministry of Agriculture) currently give priority to supplying the inputs needed by farmers using the BBM package. If this were to change, farmers may go back to growing teff or late planting of local wheat varieties because of lack of access to the inputs needed to support the BBM package.

Status

Completed

Funding

Swiss Development Corporation funds

Publication

McCann J C 1992 *Vertisol Evaluation Report: A rapid impact assessment of Vertisol technology*. Report submitted to the International Livestock Centre for Africa and the Technical Committee of the Joint Vertisol Project, July 1992.

Getachew Asamenew and Abate Tedla 1993 Research on crop and livestock intensification on small farms on Vertisols: ILCA's experience. In Report of the 1992 Annual Meeting on AFRICALAND management of Vertisol in Africa. Accra, Ghana 11-13 June 1992. IBSRAM (International Board of Soil Research and Management), Bangkok, Thailand, pp 121-129.

16: Economic cost of trypanosomosis in The Gambia, Zimbabwe, Côte d'Ivoire and Cameroon

Analysis

Ex ante economic impact

Date

1993

Input

A W Mukhebi, J Curry, B D Perry, R S Reid, B M Swallow, G J Rowlands, R L Kruska, (ILRI), J Ellis (Winrock, USA), A. Shaw (AP Consultants, UK) and I Amadou (Reading University)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), Sustainable Production Systems Programme Livestock productivity under disease risk (project 18)

Objective

To estimate the direct economic cost of trypanosomosis and to assess the economics of implementing alternative trypanosomosis control strategies

Methods

A computer spreadsheet model earlier used for the assessment of theileriosis was adapted for assessing the economic impact of trypanosomosis and alternative control strategies in selected countries The Gambia, Zimbabwe, Cote d'Ivoire and Cameroon

Findings

THE GAMBIA It was estimated that about 37% of the national herd in The Gambia are at risk annually from trypanosomosis The annual economic cost of the disease in The Gambia (discounted at 10% over 20 years) was estimated to be US\$ 5.6 million, which is an average of US\$ 279,000 per year or US\$ 1.30 per head of cattle at risk Virtually all the costs of the disease (99.9%) were attributed to production losses, with the remaining component being the cost of about 1000 chemotherapeutic treatments administered annually to livestock The main production loss (42%) was decreased milk yield The other production losses were decreases in draft power (26%), herd growth (18%), offtake (10%) and manure (5%) The high livestock densities and high level of draft power use in The Gambia imply that indirect benefits from changes in grazing patterns or an increase in draft power use are unlikely if the disease incidence were to be reduced

ZIMBABWE It was estimated that, due to extensive tsetse control, only 4% of Zimbabwe's cattle population (241,000 of a total of 6.1 million head in 1991) are at risk annually from

trypanosomosis The direct economic cost of trypanosomosis in Zimbabwe (discounted at 10% over 20 years) was estimated to be US\$ 37 million, which is an average of US\$ 1.8 million per year or US\$ 7.60 per head of cattle at risk (The undiscounted annual cost averages US\$ 4.3 million at the 1991 exchange rate) Most of this (about 98%) is the cost of disease control Of the direct cost of trypanosomosis in Zimbabwe, the cost of controlling tsetse populations with targets accounts for 68%, the cost of dipping and pour-on deltamethrin applications accounts for 27% and the cost of treating infected cattle with trypanocides accounts for 3% The remaining 2% of the cost of trypanosomosis is due to production losses

CÔTE D'IVOIRE The whole of the national herd in Côte d'Ivoire (estimated at 1.1 million head in 1991) is thought to be at risk of trypanosomosis However, about 69% of the herd are subject to a major national tsetse control project The annual (discounted) economic cost of trypanosomosis was estimated to be US\$ 5.4 million, or US\$ 4.88 per head at risk About 90% of the cost is from production losses and 10% from control costs The composition of the economic cost is as follows: reduced herd growth 25%, reduced draft power 24%, reduced milk production 24%, reduced off-take 17%, tsetse control 6%, and trypanocidal treatments 4%

CAMEROON In Adamawa Province, tsetse control has led to substantial reductions in mortality losses rather than to significant increases in cattle numbers Overall, changes in land use have been in terms of increased agro-pastoralism among previously pure pastoralists Estimates of the financial costs of different tsetse control strategies indicate that the cheapest methods were dipping, land spraying and use of targets

Status

The analysis and write up is complete, the consultancy input to develop the assessment methodology is presented in a consultant's report.

Funding

ILRI unrestricted core

Publications

ILRAD (International Laboratory for Research on Animal Diseases) 1993 Estimating the costs of animal trypanosomiasis in Africa *ILRAD Reports* 11(2) ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya

Mukhebi A W , Curry J , Perry B D , Reid R , Ellis J , Shaw A., Swallow B and Rowlands G J 1994 Comparative case studies of the economic cost of trypanosomosis *ILRAD Annual Scientific Report 1993* ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya pp 105-106

Shaw A.P M 1992 *Development of a methodology for assessing the losses due to trypanosomiasis in cattle in Africa* ILRAD Consultancy Report A P Consultants, Andover, UK 50 pp

17: Impact of dairy intensification on women in coastal Kenya

Analysis

Ex post social impact

Dates

February 1993–1995

Input

G Mullins (ILRI), L Wahome (Egerton University, Kenya), P Tsangari and L Maarse (Eibergswerg, Netherlands)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Smallholder dairy systems (project 19)

Objectives

To determine the impact of intensive dairying on women's workloads and their family responsibilities and to formulate mitigation measures for adverse impacts This study is part of an assessment of the Kenya National Dairy Development Project (NDDP) to address constraints of its package for intensification of dairy production

Methods

Data on socio-economic and production characteristics were collected in 1993 from a sample of 32 farms stratified equally into 'male contact' and 'female contact' farms

Findings

The study showed that 48% of work in the dairy unit is done by women while the labour contribution of men in both strata was relatively low This suggests that intensification of dairying would place a greater burden on women than men More positively, however, it has increased both women's personal income and household income Although control of dairy income is not proportional to labour input, there is broad consensus among respondents that household welfare has improved as a result of the intensification of the dairy enterprise

Status

The study was completed in 1995

Funding

ILRI unrestricted core

Publications

Mullins G , Wahome L , Tsangari P and Maarse L 1996 Impacts of intensive dairy production on smallholder farm women in coastal Kenya *Human Ecology* 24(2) 231-253

18: Returns to ILRI's theileriosis research

Analysis

Ex ante economic impact

Date

1993

Input

A.W. Mukhebi and B.D. Perry (ILRI)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7)

Objective

To estimate returns to ILRI's expenditures on theileriosis vaccine research based on predicted regional benefits from immunisation against theileriosis using a recombinant vaccine

Methods

Benefit-cost analysis using a 10% rate of discount was used to estimate the returns to ILRI's research expenditures on theileriosis over a 40-year period (1974–2013). A long period was chosen because of the nature of research investment: major expenditures are incurred in the early years, with major benefits accruing only in the later years.

Not all benefits generated from adoption of a new vaccine for theileriosis would be due to ILRI's research. Furthermore, the adoption of immunisation would be gradual and would be unlikely to reach 100% in all production systems and countries. The base scenario assumed that 40% of ILRI's expenditures had been allocated to theileriosis research between 1974 and 1997 (when laboratory testing of the first genetically engineered vaccine was assumed to be complete) and 5% per year would be allocated to field testing and subsequent supportive research beyond 1997. The base scenario also assumed that 50% of the incremental net income due to theileriosis immunisation at the regional level would be attributed to ILRI's research and that the adoption rate for immunisation would average 30% over the 40-year period.

Findings

The base scenario yielded a benefit-cost ratio of 3.1 and an internal rate of return of 48%. Sensitivity analysis on the proportion of ILRI's annual operational expenditures allocated to theileriosis research between 1974 and 1997, based on a range of 30–100%, yielded a benefit-cost ratio range of 3–1 and an internal rate of return range of 49–16%. With a range of incremental net income from theileriosis immunisation attributable to ILRI's research of 20–100%, the benefit-cost ratio range was 1–5 and the internal rate of return range was 10–49%. With an

immunisation adoption rate of 15–100%, the benefit–cost ratio ranged from 1 to 8 and the internal rate of return from 41 to 50%. Even if all of ILRI’s research costs up to 1997 were attributed to theileriosis research, the estimated rate of return at 16% would be substantial, given the rate of discount used in the analysis (10%). This implies that development of an effective theileriosis vaccine alone could underwrite or offset all of ILRI’s research costs since its establishment over 20 years ago. The actual benefits and returns would be much greater if indirect benefits such as ILRI’s contributions to scientific knowledge, enhancement of the national agricultural research capacity, and environmental advantages of immunisation over use of chemical acaricides were to be considered.

Status

Completed

Funding

ILRI unrestricted core

Publications

Mukhebi A W and Perry B D 1994 Estimated returns to ILRAD’s theileriosis research expenditure *ILRAD Annual Scientific Report 1993* ILRAD (International Laboratory for Research on Animal Diseases), Nairobi, Kenya pp 109–110

19: Adoption of an improved Vertisol management package in Ethiopia

Analysis

Ex post adoption

Dates

1993–1994

Input

B I Shapiro (ILRI), Aderie Adugna and J V Venkataram (Alemaya University of Agriculture)

ILRI links

Sustainable Production Systems Programme Policy analysis of crop–livestock systems (project 12), Improving crop–livestock systems in the highlands of sub Saharan Africa and Asia (project 13)

Objective

To assess the factors that determine farmers' willingness to participate in the Joint Vertisol Project–Broadbed Maker on farm trials and adopt the broadbed maker and improved seeds and fertilisers Vertisol soils have crucial importance to efforts to improve and sustain food production in Ethiopia Vertisols cover 12.7 million hectares in Ethiopia, with a potential to produce 12 million tonnes of food grains annually However, current total grain production from Vertisols is estimated to be less than 2 million tonnes The difference is due to constraints caused by waterlogging In response to a need for a low-cost, simple implement to improve drainage and hence increase grain yields, the Joint Vertisol Project (JVP), in which ILRI is a partner, developed and tested an animal-drawn broadbed maker (BBM) from 1986 to 1990

Methods

A total of 102 BBM users and 100 non users from peasant associations at three sites (Debre Zeit, Inewari, Ginchi) where the BBM technology was initially tested were interviewed A multivariate probit model was used to determine the factors affecting voluntary participation in JVP on farm trials The Weighted Least Square model was used to identify factors affecting the intended level of future adoption by the project farmers already using the BBM package The models incorporated variables such as farm and farmer resources, institutional factors, weight of the BBM, expected yields of local and improved varieties with BBM and an expected price difference between local and improved wheat varieties

Findings

Results of the probit analysis indicated that farmers' decisions on whether to participate in the JVP and use the BBM technology package was significantly influenced by farm size and the farmers'

willingness to buy fertiliser, a BBM and improved seeds. Willingness to buy inputs was negatively related to adoption, suggesting that farmers only participated in the JVP to get inputs on credit. Formal education, availability of traction power and distance to market were also found to influence participation in the on farm trials. The intended level of BBM technology package adoption was negatively influenced by the weight of the implement. The intended rate of adoption varied between 31% and 52% across different agroclimatic regions. The intended level of adoption was most significantly determined by the weight of the BBM, land-labour ratio and farmer education. Farmers recommend that the BBM be lighter than at present. The land-labour ratio influenced BBM adoption inversely, suggesting that adoption of the BBM technology package will be greatest where land is scarce and labour expensive. Farmers understand that the BBM will not increase yield without fertiliser and improved seeds, thus, extending the technology as a package is necessary and acceptable by farmers. Farmers' perceptions of the price differences between local and improved wheat varieties were also found to influence the intended level of BBM adoption.

Status

Completed

Funding

ILRI unrestricted core

Publication

Adugna Aderie 1994 *Farmers' perception and other factors influencing the adoption of an improved Vertisol management package at three on farm trial sites*. MSc thesis, Alemaya University of Agriculture, Alemaya, Ethiopia. 95 pp.

20: Economic impact of heartwater and its control in Zimbabwe

Analysis

Ex ante economic impact

Dates

1994–1997

Input

A W Mukhebi, B Perry, R L Kruska, C Laker (ILRI), M Meltzer, S Mahan, T Peter, T Martinez, T Chamboko, U Ushewokunze Obatolu and C Ncubel (Zimbabwe Central Veterinary Research Laboratory)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), University of Florida/USAID/SADC heartwater research (subproject A21N), Sustainable Production Systems Programme Systems analysis and impact assessment (project 11)

Objective

To assess the cost of heartwater and the economics of its potential control by use of the infection and treatment immunisation method in Zimbabwe

Methods

A herd spreadsheet model was used to calculate the direct economic losses caused by heartwater over a 10-year period under three scenarios baseline (current) scenario based on acaricide application, baseline scenario in 10 years assuming continued spread of the disease with current control practices, and effective control based on acaricides and/or immunisation Various vaccine adoption rates were also derived based on various epidemiological states

Findings

Preliminary results show that the estimated annual national economic cost of heartwater in Zimbabwe in 1997 was Z\$ 61.3 million (US\$ 5.6 million at the March 1997 exchange rate of Z\$ 11=US\$ 1.00) in discounted value The majority of the losses (91%) are incurred in the commercial farm sector Acaricide costs account for 76% of the losses, loss of milk production 18% and chemotherapeutic treatment costs 5% Production losses in terms of beef, animal manure and traction were minimal The annual economic loss per animal was estimated to be Z\$ 2.2 in communal systems and Z\$ 5.6 in commercial systems An immunisation based control strategy would be economically viable, with a benefit–cost ratio of about 2.4:1 in the communal sector and 7.6:1 in the commercial sector

The results indicate that at a cost of Z\$ 4, which would just break even in the communal sector, immunisation is extremely profitable, especially when undertaken concurrently with immunisation against theileriosis. This strategy would yield additional non-financial benefits to farmers and the government from the reductions in use of acaricides.

Status

Completed

Funding

ILRI unrestricted core and United States Agency for International Development

Publications

Meltzer M I , Perry B D and Donachie P L 1996 Mortality percentages related to heartwater and the economic impact of heartwater disease on large-scale commercial farms in Zimbabwe *Preventive Veterinary Medicine* 26 187-199

Mukhebi A W , Laker C D , Meltzer M I , Mahan S and Perry B D 1995 Assessing economics of alternative heartwater control strategies in Zimbabwe. In Coons L and Rothschild M (eds), *Tick borne Pathogens at the host-vector interface a global perspective Proceedings of the Second International Conference on Tick borne Pathogens at the host-vector interface 28 August-1 September 1995, Kruger National Park Vol 2 United Litho, South Africa pp 472-480*

Perry B D , Chamboko T , Mahan S M , Medley G F , Mukhebi A W , O'Callaghan C J and Peter T 1997 A study of the effect of heartwater and its control on livestock productivity in Zimbabwe. In *Epidemiologie et Sante Animale Proceedings of the Eighth International Symposium on Veterinary Epidemiology and Economics, Paris, 8-11 July 1997 Volume 2, Paper 10 03 Fondation Marcel Merieux, France*

Perry B D , Chamboko T , Mahan S , Medley G , Mukhebi A , O, Callaghan C and Peter T 1997 A study of the effects of heartwater and its control on livestock productivity and economics in Zimbabwe. In *Epidemiologie et Sante Animale Proceedings of the Eighth International Symposium on Veterinary Epidemiology and Economics, Paris, 8-11 July, 1997 Paper 10 03 Fondation Marcel Merieux, France 31-32 10 03 1-10 03 3*

21: Farmer preferences for cattle breeds in southern Nigeria

Analysis

Ex post adoption

Dates

January 1994–May 1997

Input

M A Jabbar, B M Swallow, G d'Ieteren and A.A Busari (ILRI)

ILRI links

Sustainable Production Systems Programme Improving livestock productivity under disease risk (Project 18), Policy analysis of crop–livestock systems (Project 12)

Objective

To improve the understanding of farmers' breeding practices and breed preferences in order to help target private and public programmes of breed conservation and improvement

Methods

A survey of 226 cattle-holding households was conducted in the derived savannah ecozone of Oyo State between January and June 1994. Data were collected on settlement, breed and sex composition of cattle herds and sources of cattle currently in the herd. The matrix rating or repertory grid method was used to generate a matrix of breed ratings for each respondent. Logit models were fitted to the data on breed preferences and breeding practices to determine the factors affecting the keeping of trypanotolerant cattle in southern Nigeria.

Findings

The overall matrix rating placed the White Fulani first, followed by Keteku, White Fulani × N'Dama, Muturu and N'Dama. The logit analysis showed that households that were caretakers of others' animals were likely to keep trypanotolerant breeds and households that had been resident in their present location for longer periods of time were significantly more likely to keep trypanotolerant breeds. Adoption of trypanotolerant breeds was also found to be significantly related to the farmers' subjective rating of the breeds in terms of need for mobility, ease of handling, disease resistance and market values.

Status

Completed

Funding

ILRI unrestricted core

Publications

Jabbar M A , Swallow B M , d'Ieteren G D M and Busari A A. 1997 Farmer preferences and market values of cattle breeds of West and Central Africa *Socio-economic and Policy Research Working Paper 21* ILRI (International Livestock Research Institute), Addis Ababa, Ethiopia 21 pp

Jabbar M A , Swallow B M , d'Ieteren G D M and Busari A A 1998 Farmer preferences and market values of cattle breeds of West and Central Africa *Journal of Sustainable Agriculture* 12 21-47

22: An evaluation of Vertisol/broadbed maker technology

Analysis

Ex post adoption

Dates

June 1994

Input

J C McCann (Boston University USA), M A Mohamed Saleem and Abiye Astatke (ILRI)

ILRI links

Sustainable Production Systems Programme Improving productivity and sustainability of crop-livestock systems in the highlands of sub Saharan Africa and Asia (Project 13), System analysis and impact assessment (Project 11), Feed utilisation improvement for increased livestock productivity (Project 8)

Objectives

To provide a follow up for the 1992 evaluation of the progress of improved Vertisol management technology and to assess specifically the effects of the Joint Vertisol Project (JVP) in the Inewari site, where reduction of land holdings and availability of forage, combined with no outlet for out-migration, has created 'closed' agricultural systems The study also considered the long term effects of the withdrawal of the JVP

Methods

Field visits and interviews with farmers were undertaken to assess use of the improved Vertisol management technology Farmers' knowledge base on the spread of this technology was also used as a measure of impact of the improved Vertisol management technology in the area

Findings

The study showed that farmers based their strategies on privileged access to resources provided by the project Thus, farmers will need advance notice if project support is to be withdrawn to allow them to make appropriate preparations to get seed, fertiliser and the BBM from other sources Future planning must include guidelines and timetables about the role of technology testing/project implementing agencies, and farmers must be informed of how long these agencies will be involved with a project to avoid negative effects of 'economy of expectation'

Status

Completed

Funding

Swiss Development Corporation funds

Publication

McCann J C 1994 *An evaluation of Vertisol/broadbed maker technology in Inewari, Shoa, 1994* Report submitted to the International Livestock Centre for Africa and the Technical Committee of the Joint Vertisol Project, August 1994

23. Constraints to dairy intensification in Kenya

Analysis

Ex post adoption

Dates

January 1995–December 1999

Input

W Thorpe, S J Staal and J Tanner (ILRI)

ILRI links

Sustainable Production Systems Programme Smallholder dairy systems (project 19), Identification of socio economic, policy and technical constraints in dairy systems (subproject E31N)

Objectives

To develop methodologies for analysis of smallholder dairy systems across the animal–farm–market continuum, to identify technical, policy and social constraints to the efficiency of dairying in smallholder cash crop–dairy systems, and to evaluate potential interventions to enhance dairy production Dairy production and cash crops are major components of the smallholder farms of the eastern and central African highlands

Methods

A systems approach was adopted to identify and propose interventions to alleviate constraints to smallholder dairy production and marketing through a consortium of ILRI, the Kenya Agricultural Research Institute (KARI), TSBF (Tropical Soil Biology and Fertility), the International Centre for Research in Agro forestry (ICRAF), the International Food Policy Research Institute (IFPRI), Wye College (UK), Coventry University (UK), National Resources Institute (UK), Guelph University (Canada) and the Kenya Ministry of Agriculture, Livestock Development and Marketing (MALDM) Data for these studies were collected through cross sectional surveys and longitudinal monitoring of 22 farms in Kiambu District, Central Kenya Data on nutrient flows, dairy inputs, milk products and dairy marketing were collected and quantified A rapid appraisal of the Kenya dairy subsector was conducted by KARI, Ministry of Agriculture and ILRI staff Data were analysed using spatial econometric models

Findings

Research on the factors influencing adoption of Napier grass in highland smallholder dairy systems found that production factors such as size of land holdings, agro-ecological zone and number of cattle held affected the amount of Napier planted but not the decision to plant Napier The initial adoption decision was influenced positively by human capital factors, such as education level,

farming experience and membership of a dairy co-operative. Adoption of planted fodder in other areas is thus likely to be aided by targeting farmers with higher human capital or by specific efforts to raise human capital, possibly with the focus on channelling interventions through co-operative societies. Student research on the role of women in highland smallholder dairying found that the welfare of women household members and household heads was positively affected by the dairying activities. Women were most often the co-operative members, and among a majority of male headed households women both received and controlled the use of dairy income or shared the role with men.

Status

The studies are at an advanced stage.

Funding

ILRI unrestricted core, Department for International Development (DFID-UK) Renewable Natural Resources Research Strategy (RNRS) Research Grants, DFID UK Kenya Bilateral Programme MALDM/KARI/ILRI Smallholder Dairy Project (R&D), and the Canadian University/CGIAR Linkage Project supported by the Canadian International Development Agency.

Publications

Omore A O , McDermott J J , Kilungo J , Gitau T and Staal S 1997 A comparison of the relative returns to different enterprises on mixed smallholder crop–dairy systems in Central Kenya. In *Proceedings of the 8th International Symposium for Veterinary Epidemiology and Economics (ISVEE), Paris, France, 7–11 July 1997*. *Epidemiologie Sante Animale* 31–32: 2–09.

Staal S , Delgado C and Nicholson C 1997 Smallholder dairying under transactions costs in East Africa. *World Development* 25: 779–794.

24· Economic impact of trypanosomosis on dairy production in Uganda

Analysis

Ex ante economic impact

Dates

January 1995–December 1998

Input

A W Mukhebi (ILRI), C Laker, J Opuda Asibo and K Wessel (Makerere University, Uganda),

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), Resistance to trypanosomosis control (subproject A24N), in collaboration with the Free University of Berlin Drug sensitivity phenotypes of animal trypanosomes in peri urban dairy production systems of Uganda

Objectives

To estimate the economic impact of bovine trypanosomosis on dairy cattle under current control methods, to assess the economics of alternative control strategies for bovine trypanosomosis, to determine the contribution of dairy enterprises to household income, and to evaluate potential constraints to increased dairy production. Despite extensive knowledge on the biology and ecology of the tsetse fly in Uganda, only a few estimates have been made of the economic impact of trypanosomosis control on the livestock sector in that country. There is also a dearth of information on the costs of current control strategies and the economics of alternative control options.

Methods

A random sample of 50 farms stratified by herd size into small, medium and large herds was chosen for a cross sectional survey and subsequently for longitudinal monitoring over 18 months. Herd size is a factor postulated to influence the epidemiology of trypanosomosis. The monitoring comprised monthly farm visits to collect whole farm production data and bi-monthly screening of animals for trypanosome parasites. Mixed and spreadsheet models were used to assess the risk factors for trypanosomosis and economic costs of current and alternative trypanosomosis control strategies, respectively. Linear programming was also used to determine the best resource mix for optimal dairy production.

Findings

The cost per head for trypanosomosis chemotherapy was US\$ 6.40, 3.80 and 2.60 for small, medium and large herds, respectively. The overall cost per head was US\$ 4.30. Trypanosomosis

chemotherapy does not appear to have gross crude effects on dairy enterprise farm budgets. While it constitutes up to 7.2% of health costs and 1.5% of total variable costs, it decreases profitability (gross margin) on these farms by only 1.0%. A high proportion (82%) of farms use acaricides (Deltamethrin, Flumethrin, Armitraz) that have an effect on tsetse flies.

Dairying in Mukono County is, on average, profitable. The dairy enterprise is the most important income generating enterprise, accounting for 75% of total household farm income. Overall, gross margin per farm and per head of cattle are estimated at 3.5 million Ugandan shillings (US\$) and US\$ 204,000 (1997 prices), respectively. Milk is the main product, accounting for about 86% of the output on these farms. Given the low prevalence of trypanosomiasis found on these farms (average about 4%), the low fly catches and mean expenditures for its control, trypanosomiasis is probably less of a constraint in this production system than originally anticipated. Other diseases, such as East Coast fever, appear to be more economically important and thus warrant greater attention.

Funding

German Ministry of Technical Co-operation through the Free University of Berlin

Status

Data analysis is substantially complete and the write up is expected to be ready by September 1998

Publications

Laker C D , Mukhebi A W , Patzelt R J , Peregrine A S , Mehlitz D and Opuda Asibo J 1996 The economics of trypanosomiasis control in Uganda: preliminary results of a cross sectional study. In *Livestock Production and Diseases in the Tropics: Livestock Production and Human Welfare Vol I Proceedings of the 8th International Conference of Associations of Veterinary Medicine, Berlin, Germany, 25-29 September 1995*

Patzelt R J , Schares G , Peregrine A S , Lessard P , Laker C D , Leak S G A and Mehlitz D 1996 Design of collaborative studies to assess the impact of diseases on production: case study of trypanosomiasis in peri urban dairy production systems in Uganda. In *Livestock Production and Diseases in the Tropics: Livestock Production and Human Welfare Vol II Proceedings of the 8th International Conference of Associations of Veterinary Medicine, Berlin, Germany, 25-29 September 1995*

25: Environmental and socio-economic impacts of trypanosomosis control

Analysis

Ex ante environmental impact

Dates

January 1995–December 2001

Input

R S Reid, B M Swallow, R L Kruska, B D Perry, A W Mukhebi, G J Rowlands, S G A Leak, P K Thornton, Woudyalew Mulatu, J Kagwanja, M Kamuanga, S Kiema (ILRI/CIRDES, Burkina Faso), A J Gardiner (ILRI/Regional Tsetse and Trypanosomiasis Control Project, Zimbabwe) and collaborators in Ethiopia, Zimbabwe, Kenya, UK, Burkina Faso, Cote d'Ivoire and The Gambia

ILRI links

Sustainable Production Systems Programme Livestock productivity under disease risk (project 18), Systems analysis and impact assessment (project 11), Biosciences Programme Epidemiology and disease control (project 7)

Objectives

To determine how trypanosomosis and its control affect human welfare, settlement, livestock production, crop production and land and natural resource use, to quantify the consequences of changes in cultivation and natural resource use on ecosystem structure and function, and to develop decision support systems to provide decision makers with the best available knowledge about the impacts and sustainability of trypanosomosis control

Methods

Case studies have been carried out in Burkina Faso, Ethiopia, Zimbabwe and Côte d'Ivoire. Various activities have been carried out at different intensities at different sites. Activities include (a) preliminary analysis of the impacts of controlling trypanosomosis on human welfare, human migration, settlement, livestock production, crop production, land use, vegetative structure, soil fertility and selected aspects of biological diversity, (b) an historical analysis of land-use change in response to changes in disease severity for Ethiopia and Zimbabwe, (c) development of geographic information system (GIS) data layers for field sites, including climate, vegetative cover, soils, human, livestock and tsetse populations and land use for Zimbabwe, Ethiopia and Burkina Faso, and (d) development of GIS model scenarios (which are preliminary decision-support systems) of the impacts of controlling trypanosomosis on the environment and the effects of land use change on tsetse populations over the next five decades

Findings

ZIMBABWE HISTORICAL ANALYSIS OF LAND USE CHANGE In the Kanyati study area, north western Zimbabwe, land use change was analysed for the period 1981 to 1993, during which the tsetse fly was progressively controlled. Results showed no evidence of human settlement and resource use in 1981. Between 1989 and 1993, the number of huts increased by 10% and the cultivated land area rose from 11% to 15% of the 220 km² area. During this same period, the land under fallow doubled and the area of heavily grazed woodland increased ten fold. Key informant interviews showed that tsetse control was not the root cause of land use change in this area but served to accelerate settlement. After initial settlement, tsetse control allowed farmers to own more healthy cattle and to plough land more effectively for maize, cotton and sorghum.

ZIMBABWE ECOLOGICAL IMPACTS OF TRYPANOSOMOSIS The effects of land-use change were assessed by comparing sites in wildlife conservation areas with those in adjacent communal farmlands across three broad vegetation types (mopane, miombo and alluvial). A new method was devised to measure vegetation along landscape scale transects that were subsequently used for faunal diversity studies. Cropland supported less woody canopy cover than wildlife areas in miombo and mopane vegetation but the same amount of cover in alluvial areas. Similarly, grazed land was less species rich than wildland in mopane vegetation, but more species rich in miombo. Species composition in each land use type was unique, with all types supporting both weedy and non weedy species. Although many species would be lost if wildlands were converted to agriculture, farmers conserve some important species that are rare in wildlife areas. The differences in type, direction and magnitude of land use impacts shown in this study suggest that opportunities for influencing system trajectories during agricultural conversion may be great.

ZIMBABWE SOCIO ECONOMIC IMPACTS OF TRYPANOSOMOSIS CONTROL Data from a four visit survey of 540 households were analysed to assess the impacts of tsetse control on human migration and livestock production and thus crop production. Results show that tsetse control had a large impact on the rate of in migration into particular sites within the Zambezi valley, where there is cultivatable land available. On average, migrants are more educated, have more access to off farm employment, keep more cattle, own more farm implements and cultivate more land than indigenous residents. There is an active rental market for oxen in the study sites, so that the benefits of ox ownership are dispersed among the population. Households that own their own team of oxen cultivate more land, cultivate a higher proportion of cotton and use their labour and capital more efficiently than households without animal traction.

ETHIOPIA ECOLOGICAL IMPACTS OF TRYPANOSOMOSIS The impact of land use change brought about by tsetse control on butterflies and herbaceous plants was assessed in Ghibe valley, Ethiopia. Preliminary results suggest that cropping has marked impacts on these taxonomic groups but that grazing has little impact. The Ghibe valley site is extraordinarily rich in butterfly species, with many species found only in wet highland forest sites. Most of the species were found along thin strips of gallery forests that cover only 5% of the valley floor. During the sampling, one species new to science, *Anthene* sp., was found in the study area.

ETHIOPIA SOCIO ECONOMIC IMPACTS OF TSETSE CONTROL Geo-referenced data from a census of the 5000 households within an area of tsetse control and 300 households in nearby non intervention areas were analysed to assess the impacts of pour-on use and tsetse control on crop production and the efficiency of animal traction. Various results emerged: households in the tsetse control area kept more oxen than those where tsetse was not controlled, oxen in the tsetse control area were about 50% more efficient than oxen in the non intervention area, and in the tsetse control area, even households that did not own oxen cultivated some land with animal traction.

BURKINA FASO ECOLOGICAL IMPACTS OF TRYPANOSOMOSIS The impacts of land-use change brought about by tsetse control on birds, butterflies, plants and large mammals were assessed. Bird species appeared to be negatively affected by cropping but positively affected by milder forms of disturbance. There was no appreciable difference in bird species between woodlands on sandy clay soils and those on clay hardpan. Butterfly species appeared to be little affected by disturbance at this site. Neither birds nor butterflies were affected by grazing.

GIS MODEL SCENARIOS For at least five decades, tsetse ecologists have observed that the populations of some tsetse species (particularly *Glossina morsitans*) decline as fly habitat is converted into cultivated land and host populations are reduced by hunting. Some have even suggested that tsetse control is unnecessary because human population growth and concomitant land use change will eventually control the fly, even if no formal tsetse control is attempted. This hypothesis was tested for the African continent by overlaying and analysing GIS data layers for human population density, livestock population density, land-use intensity and the distributions of different tsetse species. The literature was surveyed to establish the levels of land-use intensity (area of land cultivated) and human population density at which tsetse populations begin to decline and then disappear altogether. Several plausible human population scenarios were developed showing likely levels of human population in 2020 and 2050. These data layers were then overlaid with the distribution of each species of tsetse fly and areas of possible tsetse decline were identified. The resulting maps show that large areas of Africa will still have low human populations and thus intact tsetse habitat even more than 50 years from today. However, most people and livestock will inhabit areas of high human population density, where it is likely that *G. morsitans* populations will have diminished. In these areas, other tsetse species that are less affected by human population density, such as *G. palpalis*, *G. tachinoides* and *G. fuscipes*, will likely be the primary disease vectors. Thus, while it is certain that trypanosomosis will not disappear on its own in Africa during our lifetime, the epidemiological nature and the location and impact of the problem will shift.

Status

On going

Funding

ILRI unrestricted core and Department for International Development (UK), International Fund for Agricultural Development and the European Union

Publications

Reid R S , Wilson C J , Kruska R L and Woudyalew Mulatu 1997 Impacts of tsetse control and land use on vegetative structure and tree species composition in southwestern Ethiopia *Journal of Applied Ecology* 34(3) 731-747

Wilson C J , Reid R S , Stanton N L and Perry B D 1997 Ecological consequences of controlling the tsetse fly in southwestern Ethiopia effects of land use on bird species diversity *Conservation Biology* 11 435-447

26: Impact of trypanosomosis control in Burkina Faso, Côte d'Ivoire, Ethiopia and The Gambia

Analysis

Ex ante economic impact

Dates

1995–2001

Input

B M Swallow, G d'Ieteren, S G A Leak, M Kamuanga, G J Rowlands, J Kagwanja, R S Reid, Woudyalew Mulatu, J McDermott, C Mugalla, J Gwerek, S M Toure, B Bauer, (ILRI), I Kabore (CIRDES, Burkina Faso), A Par (SPRA, Burkina Faso), J Abo Soh, P Atse (Ministry of Agriculture and Animal Resources, Côte d'Ivoire), Leo Dempfle, W Snow, D Clifford (International Trypanotolerance Centre, The Gambia), D Kamara (Kenya Trypanosomiasis Research Institute, Kenya), R Connor (Regional Tsetse and Trypanosomiasis Control Programme, Zimbabwe) and V Chadengo (Director of Veterinary Services, Zimbabwe)

ILRI links

Sustainable Production Systems Programme Livestock production under disease risk (project 18), Systems analysis and impact assessment (project 11), Biosciences Programme Epidemiology and disease control (project 7), Alternative strategies for sustainable control of trypanosomosis (subprojects E11, E12 and P01, P06N)

Objective

To estimate the benefits, costs and economic impacts of implementing alternative trypanosomosis control strategies in Burkina Faso, Côte d'Ivoire, Ethiopia and The Gambia

Methods

Georeferenced censuses and indepth surveys were undertaken on target households during 1993–1997 to generate socio-economic data and evaluate the impacts of tsetse control interventions in the Sissili agro-pastoral zone, Ghibe valley, Ethiopia, the Satiri and Bekuy areas of Burkina Faso, northern Côte d'Ivoire, and the Zambezi valley, Zimbabwe. A participatory assessment of the use of insecticidal pour-ons to control tsetse was conducted within the Ghibe valley. Cost-benefit analysis was done to evaluate the control strategies.

Findings

Results show that the implementation of a tsetse control intervention in 1995 in the Sissili agro-pastoral zone resulted in a 14% increase in average herd size, an increase in the average number of oxen from 0.1 to 1.1 oxen per household, a reduction in the annual cattle mortality rate from

64% to 8%, reductions in the rates of abortions (from 66% to 10%) and stillbirths (from 60% to 9%), a 58% increase in the rate of live births and an increase in milk yield from 0.7 to 3.3 litres per cow per day in the rainy season and from 0.2 to 2.2 litres per cow per day in the dry season. The impacts of tsetse control on migration, livestock production and crop production were assessed in the Satiri and Bekuy areas of southern Burkina Faso. Effective tsetse control programmes have been operating in the Satiri area since 1989 and in Bekuy since 1995. The results show that tsetse control has had no significant effect on the rate of migration into the area. Only 1% of households have migrated into either area since 1992. The results also indicate a reduction in livestock mortality rates between 1987 and 1996 in the Satiri area, but no reduction in the Bekuy area. The results on crop production indicate a 20% increase between 1987 and 1996 in the number of households using animal traction in the Satiri area, while there was a 3% increase in the Bekuy area.

In south western Ethiopia, successful control of tsetse populations and trypanosome prevalence in Gullele Tolley has reduced calf mortality (including still births) by 57% and increased the ratio of live calves under 12 months of age to cows over 36 months of age by 49%.

Cost-benefit analysis of insecticidal pour on trials show that the trial would cost an average of US\$ 64 per km² per year or US\$ 1.50 per animal per year. Benefits accruing from this outlay would be about US\$ 257 per km² per year. For the average cattle-owning household in the Ghibe valley, this translates into a 30% increase in household income. The ratio of benefit to costs was 8.1 for farmers and 4.3 for the project. Benefits will continue to exceed costs in the next 10 years, the benefit-cost ratio will be particularly high if the herd continues to grow. It is projected that continuation of this trial in the Ghibe valley for the next 10 years would generate discounted net benefits of between US\$ 500,000 and US\$ 2,000,000.

Status

In progress

Funding

International Fund for Agricultural Development

Publications

Agyemang K, Dwinger R H, Little D A and Rowlands G J 1997 *Village N'Dama Cattle Production in West Africa. Six years of research in The Gambia*. International Livestock Research Institute, Nairobi, Kenya, and International Trypanotolerance Centre, Banjul, The Gambia. 131 pp

Rowlands G J, Swallow B M, Kristjanson P M, Leak S G A and Woudyalew Mulatu 1997 Sustainability and economic benefits of tsetse control using an insecticide pour-on applied to cattle in southwest Ethiopia. *VIII International Symposium on Veterinary Epidemiology and Economics, Paris, France, 8-11 July 1997. Epidemiologie et Sante Animale* 02A19 pp 31-32

27: Assessment of local participation in tsetse control

Analysis

Ex ante adoption

Dates

1993–1998

Input

B M Swallow, G d'Ieteren, M Kamuanga, G J Rowlands, Woudyalew Mulatu (ILRI), C Mugalla, S M Toure, B Bauer, I Kabore, S Amslter Delafosse (CIRDES, Burkina Faso), A Savadogo, A Pare (SPRA, Burkina Faso), J Abo Soh, P Atse (Ministry of Agriculture and Animal Resources, Côte d'Ivoire), Leo Dempfle, W Snow and D Clifford (International Trypanotolerance Centre, The Gambia) and D Kamara (Kenya Trypanosomiasis Research Institute)

ILRI links

Sustainable Production Systems Programme Livestock production under disease risk (project 18), Systems analysis and impact assessment (project 11), Biosciences Programme Epidemiology and disease control (project 7), Alternative strategies for sustainable control of trypanosomiasis (subprojects E11, E12 and P01, P06N)

Objective

To evaluate the possibilities for greater local participation in vector control in Burkina Faso, Côte d'Ivoire, Ethiopia, The Gambia and Kenya

Methods

Studies have been undertaken in several countries to determine people's willingness to participate in vector control trials and programmes. Contingent valuation surveys have been conducted in Burkina Faso, Cote d'Ivoire, Ethiopia, The Gambia and Kenya to assess people's willingness to contribute labour and money to vector control. In Burkina Faso, contingent valuation survey was conducted at three sites to evaluate willingness of people to contribute resources for the purchase and maintenance of insecticide-impregnated screens and targets prior to and during implementation of tsetse control which includes the use of pour-ons. In Côte d'Ivoire emphasis was laid on differences in contingent valuations among pastoralists (transhumant) and agropastoralists (sedentary) across the northern region in sites with varying lengths of exposure to tsetse control using traps and screens. In Kenya, the contingent valuation survey was followed by a trial in which local residents undertook tsetse control using baited targets. Contingent contributions were compared with planned and actual contributions. In The Gambia, the contingent valuation survey was implemented three times before, during and after a vector control trial to determine how people's willingness to contribute changed between seasons and as they

learned more about the pour ons and sprays that were being supplied free of charge. In Ethiopia, the emphasis was put on people's actual willingness to contribute to vector control using pour-on treatments of insecticides.

Findings

Contingent valuation surveys in Central River Division of The Gambia studied farmers' willingness to pay for tsetse control in anticipation of the eventual need to recover costs. Households inside and outside a trial intervention area were asked on three occasions before and during the trial how much they would be willing to pay for insecticide sprays or pour ons. Average willingness to pay per treatment declined in all areas from Dalasi 8.32 to 2.59 (D 9.50 = US\$ 1), but declined least in the area where the trial was being implemented. It was observed that the ability to pay fluctuated with seasons and that experience with the sprays or pour ons affected farmers' expectations of the benefits of the treatments.

Contingent contributions per month in Burkina Faso and Cote d'Ivoire ranged from CFA 140 to 965 (CFA 500 = US\$ 1, average in 1997) with clear indication that pastoralists would be willing to contribute more cash than labour to tsetse control as compared to agropastoralists. In addition, those who preferred contributing both cash and labour pledged significantly higher amounts of resources than those willing to contribute either cash or labour and not both.

Comparisons of the contingent, planned and actual contributions to community-managed vector control in western Kenya indicate that the contingent valuation survey produced relatively accurate estimates of people's actual behaviour on average but relatively inaccurate estimates of the behaviour of specific households. The results also indicate that involvement in the survey increased people's willingness to contribute to the trial. Survey respondents in both villages contributed more labour and more money than the average household in their villages.

Contingent valuation in Ethiopia showed that willingness to contribute money and labour was 2.1 Birr (± 1.6 s.d.) (5 Birr = US\$ 1) and 2.2 (± 1.2) days per month. The willingness to contribute money for tsetse control was related to the gender of the household head, number of cattle held by the household and participation of the household in a monitoring exercise conducted by ILRI. Willingness to contribute labour was related to employment status and the information available to respondents about the tsetse control programme.

Status

The study will be completed by the end of 1998.

Funding

ILRI unrestricted core, European Development Fund and the International Fund for Agricultural Development.

Publications

Echessah P N , Swallow B M , Kamara D W and Curry J J 1997 Willingness to contribute labour and money to tsetse control application of contingent valuation in Busia District, Kenya *World Development* 25(2) 239-253

Swallow B M and Woudyalew Mulatu 1994 Evaluating willingness to contribute to a local public good application of contingent valuation to tsetse control in Ethiopia *Ecological Economics* 11 153-161

Kamuanga M , Kabore I , Swallow B , Amsler Delafosse S and Bauer B 1997 Evaluating factors affecting implementation of community based tsetse control using insecticide impregnated screens in southern Burkina Faso In *Proceedings of the 23rd meeting of the International Scientific Council for Trypanosomiasis Research and Control (ISCTRC) held at Banjul, The Gambia, 11-15 September 1996* No 118 Organization of African Unity (OAU)/ Scientific Council of Trypanosomiasis Research and Control (SCTRC), Nairobi, Kenya pp 318-330

28: Economic impacts of rinderpest control in selected countries of Africa

Analysis

Ex post economic impact

Dates

1996–1998

Input

E Tambi, O Maina, A W Mukhebi, (ILRI) R Bessin and H M Solomon (Organization of African Unity/Inter-African Bureau for Animal Resources, OAU/IBAR)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7)

Objective

To assess the economic impacts of the Pan African Rinderpest Campaign (PARC) in Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Mali, Senegal and Uganda Specific objectives are to quantify donor and government financial and material contributions to the PARC programme, to determine returns to investments into PARC, to estimate gains and losses in human welfare due to rinderpest control and to develop a methodology for global assessment of PARC

Methods

Data are being collected from each country on disease costs and impacts and used in spreadsheet models developed at ILRI to estimate benefit–cost ratios and to calculate economic surpluses of rinderpest control programmes in the various countries Existing secondary data sources are being used where possible, supplemented by expert opinion of persons knowledgeable about rinderpest and PARC in each country

Findings

Ex post assessment of the economics of rinderpest and its control in Ethiopia showed that rinderpest caused significant economic losses to cattle producers Studies on returns to investment showed that rinderpest control was economically profitable and that the losses avoided through control were substantial, contributing about 1% to the real value of agricultural GDP Rinderpest control was also profitable in Ghana, with a benefit–cost ratio of 1.7:1 for the PARC programme In Mali, rinderpest control was also economically viable, the net effect of PARC was to increase net income per animal by some 37% Welfare effects of rinderpest control in East Africa were calculated and shown to arise mostly from increased milk offtake in Ethiopia and Kenya and mostly from beef in Tanzania and Uganda The annual welfare effects of PARC were estimated at US\$ 254, 222, 128

and 83 million in Ethiopia, Kenya, Tanzania and Uganda, respectively, with about 60% accruing to producers

Status

On going

Funding

European Union grant to the Organization of African Unity/Inter-African Bureau for Animal Resources

Publications

Tambi E N , Mukhebi A W, Maina O W and Solomon H M 1997 *Privatization of Animal Health Services in Kenya An Evaluation of the Kenya Veterinary Association Privatization Scheme (KVAPS)* Organization of African Unity/Inter African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 84 pp

Tambi E N , Mukhebi A W, Maina O W and Solomon H M 1998 *Probit Analysis of Livestock Producers' Demand for Private Veterinary Services in the High Potential Agricultural Areas of Kenya* Organization of African Unity/Inter African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 30 pp

Tambi E N , Maina O W and Mukhebi A W 1997 *An Economic Impact Assessment of the Pan African Rinderpest Campaign in Ethiopia* Organization of African Unity/Inter African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 78 pp

Tambi E N , Maina O W , Mukhebi A W and Bessin R 1997 *An Economic Impact Assessment of the Pan African Rinderpest Campaign in Ghana* Organization of African Unity/Inter-African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 75 pp

Tambi E N , Maina O W , Mukhebi A W and Bessin R 1997 *An Economic Impact Assessment of the Pan African Rinderpest Campaign in the Republic of Mali* Organization of African Unity/Inter African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 69 pp

Tambi E N , Maina O W and Mukhebi A W 1998 *Assessing the Welfare Gains from Rinderpest Control in East Africa* Organization of African Unity/Inter-African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 26 pp

Tambi E N , Maina O W and Mukhebi A W 1997 *Livestock Trade and Marketing in Africa Current Situation and Proposed Strategy for Development* Organization of African Unity/Inter-African

Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 33 pp

Tambi E N, Maina O W and Mukhebi A W 1998 *Le commerce du bétail et sa commercialisation en Afrique Situation actuelle et stratégie proposée en vue de développement* Organization of African Unity/Inter African Bureau for Animal Resources/Pan African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 34 pp

Tambi E N, Maina O W, Mukhebi A W and Bessin R 1998 *Cost of Rinderpest Vaccinations Incurred by the European Commission and National Governments in Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Mali, Senegal and Uganda* Organization of African Unity/Inter African Bureau for Animal Resources/Pan-African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 28 pp

Tambi E N and Maina O W 1998 *An Analysis of Kenya's Livestock Commodity Export Supply* Organization of African Unity/Inter African Bureau for Animal Resources/Pan-African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 22 pp

Tambi E N and Maina O W 1998 *Policy reforms in the delivery of animal health services implemented under the Pan African Rinderpest Campaign* Organization of African Unity/Inter African Bureau for Animal Resources/Pan-African Rinderpest Campaign/International Livestock Research Institute, Nairobi, Kenya 24 pp

29 Benefits of integrating cereals and forage legumes with crossbred dairy technology

Analysis

Ex ante economic impact

Dates

January 1996–June 1997

Input

M A Jabbar, M A Mohamed Saleem (ILRI), Menale Kassie and Belay Kassa (Alemaya University of Agriculture)

ILRI links

Sustainable Production Systems Programme Improving productivity and sustainability of crop–livestock systems in the highlands (Project 13), Systems analysis and impact assessment (project 11), Smallholder dairy systems (Project 19), Capacity development for strengthening NARS (project 20)

Objective

To determine the economic benefits of intercropping cereals and forage legumes in mixed farms with and without improved dairy cattle

Methods

A linear programming model was used. Experimental data on the performance of various crop–forage intercropping combinations and farm survey data on resource endowments, their allocation and prices were used to develop model parameters. Benefits of integration in terms of nitrogen fixation and better nutrition for animals were accounted for.

Findings

The introduction of forage legumes with cereals changes cropping patterns substantially from current practices but does not significantly change the pattern of use of labour and ox power, which are the principal farm resources. Intercropping significantly increases gross margin and cash income and the introduction of crossbred cows enhances these returns even further. Intercropping also significantly enhances the share of livestock in farm and cash income when crossbred cows are included. Sensitivity analyses show that the improved technologies remain more profitable than current practices even when there is a substantial decrease in output prices.

Status

Completed

Funding

ILRI unrestricted core

Publications

Menale Kassie 1997 *Economics of food crops–forage legumes integration in mixed farms in the Ethiopian highlands* MSc thesis, Alemaya University of Agriculture, Alemaya, Ethiopia 115 pp

30: Adoption of trypanotolerant cattle in southern Burkina Faso

Analysis

Ex post adoption

Dates

January 1996–December 1998

Input

Kouadio Tano, Merle Faminow, B M Swallow, G d'Ieteren, R Eley and M Kamuanga (ILRI)

ILRI links

Sustainable Production Systems Programme Improving livestock productivity under disease risk (Project 18), in collaboration with Centre international de recherche–développement sur l'élevage en zone subhumide (CIRDES) and the International Trypanotolerance Centre (ITC)

Objective

To identify factors affecting the adoption of trypanotolerant cattle (Baoule) in southern Burkina Faso

Methods

A logit adoption model was used to investigate the adoption of Baoule cattle in southern Burkina Faso. The model was constructed using socio-economic and production data generated from a survey of 299 households in 29 villages during January and February 1996. Preliminary focus group interviews with farmers were used to rate cattle breeds according to important traits. The farmers were asked to rate each breed of cattle for important traits on a 1–5 scale (1 = poor, 5 = good). The traits included disease resistance, fitness for traction, feeding ease, temperament, weight gain, fertility, fecundity, milk yield and size. The main factors which were hypothesised to have an impact on the probability of adoption of Baoule were farmer decision making involvement in herd management, the area of origin of farmers, the type of production systems used by farmers and farmers' perceptions of the relative performances of breeds.

Findings

The analyses showed that the type of production system and farmers' subjective evaluation of the breeds' performance were significant determinants of the adoption of Baoule. Indigenous farmers and farmers involved in a traditional subsistence system were also more likely to have Baoule. The impact on beef and milk production of the adoption of Baoule was positive and statistically significant and this shows the immense potential of trypanotolerant cattle to meet long term beef and milk demands.

Status

Completed

Funding

ILRI unrestricted core and European Development Fund

Publications

CIRDES/ITC/ILRI (Centre international de recherche-développement sur l'élevage en zone subhumide/International Trypanotolerance Centre/International Livestock Research Institute) 1997 *Joint Report of Accomplishments and Results (1993-1997)* Collaborative Research Programme on Trypanosomosis and Trypanotolerant Livestock in West Africa CIRDES, Bobo Dioulasso, Burkina Faso, ITC, Banjul, The Gambia, and International Livestock Research Institute, Nairobi, Kenya 200 pp

Tano Kouadio 1998 *Genetic preferences of smallholders and trypanotolerant cattle in Southern Burkina Faso* PhD thesis, University of Manitoba, Canada pp 98-120

31: Potential returns to ILRI's smallholder dairy research

Analysis

Ex ante economic impact

Dates

May–December 1996

Input

P Kristjanson, M Lipner, W Thorpe, S J Staal, C F Nicholson, A Freeman and B I Shapiro (ILRI)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Smallholder dairy systems (project 19)

Objectives

To identify expected outputs of ILRI smallholder dairy research and to produce reliable estimates of the potential productivity impact of successful research in this area, the length of time to and probability of research success, and the adoption lag and ceiling level

Methods

This assessment involved compilation of secondary data and interviews with ILRI dairy researchers and collaborators to specify an economic surplus model to estimate potential returns to smallholder dairy systems research

Findings

The net present value of the stream of benefits generated over the next 30 years was estimated at US\$ 20 million, using conservative estimates of the potential productivity gains and likely adoption patterns. The internal rate of return on this research investment is at least 25%, or more than seven times the initial investment. Actual returns could be much higher, since the benefits of this research could extend beyond the two zones of Africa included in this analysis, and thus the interventions could be adopted faster by many more producers. Productivity impacts could also be greater than those captured by milk output alone (e.g. greater use of dairy animals for draft power or increased use of manure to increase cereal yields). Results of the analysis suggest that consumers will potentially benefit even more than producers due to more and cheaper milk becoming available with the adoption of the new technologies generated from the research.

Status

Completed

Funding

ILRI unrestricted core

Publication

Kristjanson P 1997 Returns to smallholder market-oriented dairy research *Measuring Returns to ILRI's Research Systems Analysis and Impact Assessment Working Paper No 97-1* ILRI (International Livestock Research Institute), Nairobi, Kenya pp 30-34

32: Potential returns to ILRI's research in genetics of resistance to helminthiasis

Analysis

Ex ante economic impact

Dates

May–December 1996

Input

P Kristjanson, M Lipner, L Baker, E Rege and A Teale (ILRI)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Biosciences Programme Characterisation, conservation and use of animal genetic resources (project 1), Development of disease-resistant livestock (project 2)

Objectives

To identify expected outputs of ILRI's research into the genetics of resistance to helminthiasis and to produce reliable estimates of the potential productivity impact of successful research in this area, the length of time to and probability of research success and the adoption lag and ceiling level

Methods

This assessment involved compilation of secondary data and interviews with ILRI scientists to specify an economic surplus model estimating the potential returns to improved breeding practices for sheep in Africa, influenced by the shorter-term results of ILRI's research, and introduction of sheep breeds resistant to helminthiasis, arising from the longer term results of this area of research

Findings

The estimated net present value of breed characterisation research is US\$ 52 million, with a rate of return of 42% and a benefit–cost ratio of 29.1. Expected net benefits of the longer run output of this research (genetic markers) were estimated at US\$ 12 million, or more than four times the research investment. These returns were calculated based on conservative assumptions about how much impact the research might have, where the impact would be (sub-Saharan Africa only), on what the impact would be (sheep production only) and how quickly the research results would be adopted.

Status

Completed

Funding

ILRI unrestricted core

Publications

Kristjanson P 1997 Returns to disease resistance helminthiasis research *Measuring Returns to ILRI's Research Systems Analysis and Impact Assessment Working Paper No 97 1* ILRI (International Livestock Research Institute), Nairobi, Kenya pp 35-41

33: Potential returns to ILRI's feed research

Analysis

Ex ante economic impact

Dates

May–December 1996

Input

P Kristjanson, M Lipner, J Tanner and P Osuji (ILRI)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Smallholder dairy systems (project 19), Biosciences Programme Feed utilisation for improving livestock productivity (project 8)

Objective

To identify expected outputs of ILRI's feed research and to produce reliable estimates of the potential productivity impact of successful research in this area, the length of time to and probability of research success and the adoption lag and ceiling level

Methods

This assessment involved compilation of secondary data and interviews with ILRI scientists to specify an economic surplus model estimating the potential returns to strategic dry and wet season supplementation of cattle in West and central Africa and to a feed strategy using basal forage and concentrate supplementation for crossbred cows in East Africa

Findings

The net present value of the stream of benefits generated from this area of research over the next 30 years is estimated to be US\$ 137 million, or 55 times higher than ILRI's expenditure on feed research. The rate of return to ILRI's feed research ranges from 17% to 26% in western and central Africa and from 38% to 44% in eastern Africa. The assumptions in the baseline analysis were conservative since they included impact only in terms of potential increase in milk output with improved feed strategies, with an adoption lag of 20 years and a maximum level of adoption estimated at only 10% of farmers currently producing milk.

Status

Completed

Funding

ILRI unrestricted core

Publication

Kristjanson P 1997 Returns to feed research *Measuring Returns to ILRI's Research Systems Analysis and Impact Assessment Working Paper No 97-1* International Livestock Research Institute, Nairobi, Kenya pp 47-53

34: Impacts of producer milk processing groups in Ethiopia

Analysis

Ex post economic impact

Dates

September 1996–October 1998

Input

C F Nicholson, Getachew Gebru, S Ehui, B I Shapiro (ILRI), C Delgado (International Food Policy Research Institute, IFPRI) and collaborators in the Smallholder Dairy Development Project/Ministry of Agriculture, Ethiopia

ILRI links

Sustainable Production Systems Programme Smallholder dairy systems (project 19), IFPRI Multi-country Project (MP-7) on Agricultural Diversification and Export Promotion

Objectives

To determine the value of producer milk processing groups to dairy development strategies, which households are likely to participate in the processing groups and the technical and financial performance of the groups. A secondary objective is to document marketing outlets and sales patterns.

Methods

Data were collected from a stratified random sample of 144 households in four peasant associations (PAs) in the Shewa and Arsi regions of the Ethiopian highlands. In each region, sample households were from either a 'milk group' PA (near a milk processing group) or a 'control' PA (nearby but beyond easy distance for selling liquid milk to the milk groups). The sample in each PA also was stratified by ownership of crossbred dairy cattle, distance to a dairy product market and milk group participation. Data were collected at the household from June through November 1997. Markets at which households in the four PAs sell dairy products were surveyed from June through October 1997 to examine containers in which dairy products were sold and to establish the variation in production quality and unit prices. Four milk groups were in operation in Shewa and Arsi regions at the time the study began. Data to evaluate the technical and financial performance of the groups were collected from all four groups. Data on milk group performance were collected from records maintained by the milk groups for the period May–November 1997. Data on the characteristics of milk group sales were collected at the four milk group sites from June to November 1997.

Findings

Preliminary analysis indicates the following Costs of searching for buyers of dairy products are near zero for nearly all households The risk of not finding a buyer for dairy products (butter, local cheese) appears to be minimal for most households Participation in the milk groups changed household allocation and marketing strategies for milk (but most households selling milk to the groups continued to process some milk into butter for sale in local butter markets) The processing efficiency (yield per unit milk) for butter and local cheese varied substantially for the four milk groups Only one of the groups made a substantial profit during the period for which data were collected Profitability was higher for groups that were able to sell most of the butter produced during the period of the survey (i e groups that did not accumulate large inventories of butter) Characteristics of buyers (type of buyer, purpose for which product was purchased, and amount bought) differ substantially for the four milk groups

Status

Data collection was completed in late 1997, data entry and correction will be completed in mid 1998 Further work to examine the impacts listed above is under way

Funding

ILRI policy project (L02A) funding for data collection and processing, Rockefeller Foundation support through October 1997

Publications

Nicholson C F 1996 *Transactions costs in the household model applications to dairy marketing in the developing world* Policy Project, International Livestock Research Institute, Addis Ababa, Ethiopia June 1996 (mimeo) 15 pp

Staal S , Delgado C and Nicholson C 1997 Smallholder dairying under transactions costs in East Africa *World Development* 25 779-794

35: Impacts of planted forages in West Africa

Analysis

Ex post economic impact

Dates

January 1997–March 1998

Input

P K. Thornton, E Elbasha (ILRI), G Tarawali (consultant agronomist, Ibadan, Nigeria), R von Kaufmann, P Kristjanson, P de Leeuw, M A Mohamed Saleem, G O'Donoghue and J Smith (ILRI)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Improving crop–livestock systems in subhumid sub Saharan Africa and Asia (project 14)

Objective

To quantify the impact of work carried out by ILRI and national research partners between 1977 and 1993 in developing and promoting among agro-pastoralists in West Africa the concept of planting forage legumes to help alleviate stress on their ruminant animals during the dry season. A 'fodder bank' comprises an area of farmland fenced and planted to *Stylosanthes* or other legumes that can be used for strategic feeding during the early dry season. Some cropping systems were also developed in which a cereal is subsequently planted in the fodder bank to make use of the nitrogen fixed by the legume.

Methods

The study involved two major activities: a scouring of the literature to quantify production impacts of fodder bank technology, and commissioning a consultant to travel extensively in the region to collect up-to-date information from national agricultural research and extension programmes on the number of adopters of the technology. Modest estimates of the impact of forage legumes on meat and milk production were derived from a dynamic herd simulation model and estimates of their impact on maize, millet and sorghum grain and residue were gathered from the literature. These estimates, together with commodity price data, elasticities of supply and demand and estimates of research costs were combined in an economic surplus model with the number of adopted hectares of forage legumes.

Findings

Nearly 28,000 adopters were identified, growing forage legumes on some 19,000 ha in 15 countries of the region. On an expenditure of research resources of some US\$ 7 million, total benefits to

society that have accrued up to 1997 amount to US\$ 22 million, with an internal rate of return of some 40%. The analyses were repeated using two scenarios of projected adoption trends to the year 2014, resulting in at least a quadrupling of the estimated total benefits realised to date. There are serious constraints to the adoption of forage legumes in many places but legumes occupy particular niches in the farming systems of West Africa. The impact of fodder banks has already paid for the research that went into their development at least three times over. The lag associated with the diffusion of this technology has been considerable in some countries (up to fifteen years). Results are probably conservative, given the modest production impacts used. The adoption data are strong, but these are balanced by absence of some cost and price information and weak elasticity data.

Status

The study is complete

Funding

ILRI unrestricted core

36: Smallholder dairy technology in coastal Kenya

Analysis

Ex post adoption

Dates

March 1997–June 1998

Input

P K Thornton, C F Nicholson, E Elbasha, W Thorpe, S J Staal, B D Perry, (ILRI) R Munga, D Mwamachi, L Mohammed (Kenya Agricultural Research Institute, KARI), G Wainaina (Ministry of Agriculture, Livestock Development and Marketing, MALDM), L Sechrest, M Stewart and T Stickle (University of Arizona)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Smallholder dairy systems (project 19), Biosciences Programme Epidemiology and disease control (project 7)

Objectives

To understand factors affecting adoption of technologies that lead to intensification of smallholder dairy production in Kilifi, Kwale and southern Malindi districts in Coastal Province, Kenya, and to estimate the impacts of adoption at the individual household level

Methods

Major constraints to development of smallholder dairy systems on the Kenya Coast have been the risk of East Coast fever (ECF) and other diseases, which have had a large inhibitory effect on adoption of technology and intensification, and lack of secure market outlets, most sales coming informally over the farm gate. From 1989 to early 1994, KARI, MALDM, ILRI and other collaborators undertook a range of activities on four major fronts: (a) to promote use of crossbred cattle and improved breeding schemes, (b) to conduct economic impact assessments of the benefits of ECF control through vaccination, (c) to introduce on station and then on farm best-bet forages and to design integrated feeding systems that employ green manures and applications of animal manure in these systems (Napier grass, *Leucaena*, *Gliricidia*, and *Clitoria* were the key species of fodder crops), (d) to conduct consumption studies on the increasing demand for liquid milk, these studies were complemented by nutrition and health surveys showing the substantial benefits of providing children with protein and energy in the form of milk. To assess the rates of adoption of the various technologies tested at the Kenya Coast, inventories were drawn up of small- or medium scale farmers with dairy cows in the project area (the coconut–cassava zone and the cashew–cassava zone in Kilifi, Kwale and southern Malindi districts). A total of 200 households

were surveyed, with questions on smallholders' perceptions of the availability, cost and appropriateness of the technologies for their conditions, and information was gathered on the household, land holdings, income and use of resources, and off farm economics. A second set of surveys was designed and administered to a second sample of 200 households to assess the impact of adoption on smallholder incomes, employment, productivity and child health and nutrition.

Findings

An estimated 720 dairy smallholders in the project area and preliminary results indicate substantial district level variations in adoption as a function of differences in trypanosomosis challenge and infrastructural factors. The adoption survey data are still being analysed and the impact survey data are still being collected. These data will be combined with data from other case studies and from informal interviews to improve understanding of the factors that determine the uptake of particular dairy technologies.

Status

Will be completed and written up by mid-1998.

Funding

ILRI unrestricted core and CGIAR Impact Assessment and Evaluation Group

37: Adoption pathways for the broadbed maker

Analysis

Ex post adoption

Dates

January–December 1997

Input

M A Jabbar, M A. Mohamed Saleem, Solomon Gebresellasie (ILRI) and Hailu Beyene (Ethiopian Institute for Agricultural Research)

ILRI links

Sustainable Production Systems Programme Improving crop–livestock systems in the highlands of sub-Saharan Africa and Asia (project 13)

Objective

To elucidate BBM adoption behaviour of farmers in three on-farm research sites in the Ethiopian highlands The Joint Vertisol Project developed the broadbed maker (BBM) to solve waterlogging problems in the Vertisol soils of highland Ethiopia with the objective of improving the productivity of crop–livestock systems The BBM technology package was tested for eight years on farms in the Ethiopian highlands

Methods

A framework was developed to analyse BBM adoption behaviour of a sample of 598 households in 10 Peasant Associations (5 in Inewari, 2 in Hidi and 3 in Ginchi) through on-farm research and tests during 1989–95 and a socio-economic survey conducted during late 1995 and early 1996 Logit and tobit regression models were used to identify factors influencing adoption decisions

Findings

Classifying farmers as adopters or non-adopters failed to shed light on the adoption process Rather, a multistage decision process appeared to occur, in which farmers moved from learning to adoption and then to continuous or discontinuous use of the technology Various lags were observed to occur between learning and adoption, and there were incidences of discontinuing use of the BBM and then re-adopting the technology Since the results of this study suggest that technology adoption is not a matter of a one time decision leading to continuous technology use, a relatively long period may be required for farmers to adopt a new technology, even one that is demonstrably profitable for them

Status

Completed

Funding

ILRI unrestricted core

Publication

Jabbar M A , Beyene H , Mohamed Saleem M A and Gebreselassie S 1998 *Adoption pathways for new agricultural technologies An approach and an application to Vertisol management technology in Ethiopia* Socio-economic and Policy Research Working Paper No 23 Livestock Policy Analysis Project, International Livestock Research Institute, Addis Ababa Ethiopia 27 pp

38· Potential returns to trypanosomosis vaccine research in sub-Saharan Africa

Analysis

Ex ante economic impact

Dates

January 1997–December 1997

Input

P Kristjanson, B M Swallow, G J Rowlands, R L Kruska and P de Leeuw (ILRI)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Improving livestock productivity under disease risk (project 18), Biosciences Programme Immunology and vaccine development (project 4), Improving livestock productivity through development of subunit vaccines (project 5)

Objectives

To explore options for measuring the potential productivity impact of successful trypanosomosis control using a simulation herd model, to link results of this model spatially using geographic information system (GIS) tools to determine where the potential increase in livestock productivity from new technologies will occur, and to investigate how uncertainties in tackling difficult research problems such as the development of a trypanosomosis vaccine can be addressed using an economic surplus model to value the returns to this area of research

Methods

This research involved a multidisciplinary collaborative effort to specify and integrate models examining the biophysical, economic and spatial aspects of trypanosomosis in Africa. First, a biophysical herd simulation model was used to estimate the productivity of cattle before and after tsetse control, using field data from Ghibe, Ethiopia. Second, an economic surplus model was constructed to value this increase in productivity and capture the uncertainties involved in on going development of a new technology (i.e. a trypanosomosis vaccine). Third, GIS tools were used to overlay tsetse distribution with cattle densities to determine the livestock population at risk, estimate cattle densities in tsetse and non tsetse areas and extrapolate the Ghibe results to the rest of Africa.

Findings

The potential productivity gains estimated in the herd model (comparing the productivity of cattle before and after successful tsetse control) suggest that a vaccine could significantly reduce the cost

of producing milk and meat in Africa. The lower production costs would lead to increased meat and milk supplies and reduced prices to consumers. The value of the potential increase in milk and meat production with trypanosomosis control was estimated at US\$ 700 million per year. The net present value of ILRI and collaborators' trypanosomosis vaccine research was estimated to be at least US\$ 288 million, with an internal rate of return of 33% and a benefit-cost ratio of 34:1.

Funding

ILRI unrestricted core

Publication

Kristjanson P. 1997. Returns to trypanosomosis vaccine research. *Measuring Returns to ILRI's Research: Systems Analysis and Impact Assessment Working Paper No. 97.1*. ILRI (International Livestock Research Institute), Nairobi, Kenya. pp. 17-29.

39· Decision-support systems to improve human welfare and conserve ecosystem integrity

Analysis

Methodology development

Dates

January 1997–December 2001

Input

R S Reid, R L Kruska, P K Thornton (ILRI), M Coughenour, K Galvin, J Ellis (Colorado State University) and collaborators in Uganda, Kenya and Tanzania

ILRI links

Sustainable Production Systems Programme Livestock productivity under disease risk (project 18), Systems analysis and impact assessment (project 11)

Objectives

To analyse past successes and failures in simultaneously improving the welfare of livestock keepers and conservation of biodiversity through use of geographic information system (GIS) and remote sensing technologies and to use this analysis to develop a decision-support system that will provide a variety of management and policy scenarios to improve the welfare of livestock keepers while conserving biological diversity. These systems will be targeted at donors, natural resource managers and livestock managers. The system will first be developed for pastoral systems in East Africa with possible future applications to other regions.

Methods

GIS data layers of human population changes in Africa are being developed and refined. This information will form a cornerstone for efforts to understand where the conflicts between livestock production, human needs and the environment will be over the next half century. GIS analysis and development of the decision-support system is under way to help balance the need to conserve biological diversity with human needs in pastoral systems in East Africa.

Findings

Preliminary analysis of past conflicts between pastoralists and wildlife suggests that both wildlife and domestic livestock populations have been decreasing in East Africa over the last two decades. The loss of both wildlife and livestock resources appears to be lowest in areas where community and national conservation programmes are viable. These data are being further analysed to understand where and how human and conservation needs are being satisfied. This information

will be used to develop a decision support system that will assess different policy and management scenarios for East African rangelands

Status

On going

Funding

ILRI unrestricted core and United States Agency for International Development

40: Cost of tick-borne diseases of livestock in Africa, Asia and Australia

Analysis

Ex ante economic impact

Dates

May 1997–May 1999

Input

P Kristjanson, B D Perry, P K Thornton (ILRI), R Dalgliesh (Australian Centre for International Agricultural Research), R McLeod (consultant) and G Lubulwa (Zimbabwe Department of Veterinary Services)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), Sustainable Production Systems Programme Systems analysis and impact assessment (project 11)

Objectives

To estimate the costs of tick-borne diseases in cattle in Africa, Asia and Australia and returns to an integrated package of tick borne disease control technologies

Methods

Extensive data are being collected on the prevalence, productivity impacts and economic costs of tick-borne diseases (theileriosis, anaplasmosis, babesiosis and tick worry) for Africa and Asian countries where secondary data are available. A rapid appraisal of selected Asian and African countries to collect primary data will also be carried out. Spreadsheet and simulation models will be used to estimate the overall costs of these diseases and the potential benefits from their control.

Findings

Preliminary results on the estimated costs of tick-borne diseases in Africa and Asia are expected by mid-1998.

Status

In progress

Funding

Australian Centre for International Agricultural Development

41: Genetic improvement of millet and sorghum residues

Analysis

Ex ante economic impact

Dates

August 1997–May 1998

Input

P Kristjanson, E Zerbinı (ILRI), K P C Rao (economic consultant), M Ravindra (GIS specialist), and P Hofs (livestock/feed modelling consultant)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Improving crop–livestock systems in semi arid sub-Saharan Africa and Asia (project 15)

Objective

To produce a reliable estimate of returns to a proposed research programme aimed at improving the quality and quantity of millet and sorghum crop residues through genetic enhancement

Methods

Within the target production systems of the semi arid tropics of South Asia, identified using geographic information system (GIS) tools and primary data collected from 165 small farming households, available biological response coefficients were applied to a feed simulation model to estimate herd productivity gains that could be realised through use of higher quality millet and sorghum residues as feed These productivity impact estimates were valued using an economic surplus model and the potential returns to this area of research were estimated

Findings

The recommendation domain or zone targeted for the likely adoption of improved dual-purpose sorghum and millet varieties was estimated to cover 33% of India's land area and affect 221 million people and 46 million cattle The analysis suggests that a 1% increase in digestibility of millet and sorghum residues, achieved through the joint research efforts of plant breeders at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and an ILRI animal nutritionist, would result in increases in milk, meat and draft power outputs ranging from 3.2 to 10.7% The net present value of such productivity increases was estimated to be US\$ 42 million with an internal rate of return of 28%, using cautious assumptions regarding likely timing of research success, adoption rates and the scope of the benefits These predicted research returns increased to a value of US\$ 208 million with an internal rate of return of 43% as less cautious assumptions were made regarding these uncertain parameters

Status

Completed

Funding

Swiss Development Corporation

Publications

ILRI/ICRISAT (International Livestock Research Institute/International Crops Research Institute for the Semi Arid Tropics) 1998 *Genetic enhancement of sorghum and millet residues fed to ruminants. An ex ante assessment of returns to research*. A Report submitted to the Swiss Agency for Development and Co-operation, April 1998 43 pp

42: Hay-making technology in southern Ethiopia

Analysis

Ex post adoption

Dates

September 1997–1998

Input

B M Swallow, W Luseno, A Kamara (ILRI) and N McCarthy (ILRI/International Food Policy Research Institute)

ILRI links

Sustainable Production Systems Programme Policy analysis of crop–livestock systems (project 12), Property rights and the sustainable improvement of livestock production systems (subproject LO4A)

Objectives

To better understand grazing management under different property rights regimes and with different environmental and production risks, to identify conditions under which different development pathways are followed, and to identify how policy and other external interventions can help communities to achieve preferred development pathways This study on hay technology on the Borana Plateau in southern Ethiopia is part of a broader livestock systems study on property rights, risk and livestock development conducted jointly by ILRI, the International Food Policy Research Institute (IFPRI), the Institute for Rural Development at the University of Göttingen and national agricultural research systems in Ethiopia and Niger Field research was conducted on the Borana Plateau, where ILRI was engaged in a livestock systems study between 1980 and 1991 The study identified hay making as an appropriate production technique to improve livestock nutrition CARE, a collaborator in the systems study and an important non governmental organisation in the area, recommends hay making as part of its extension package for Borana farmers

Methods

A survey of 40 Borana communities, each with about 100 households, was conducted from September 1997 to February 1998 on the Borana Plateau Questions were asked about the practice of hay making and related activities in each community

Findings

Preliminary analysis indicates that 33% of the sampled communities of agro-pastoralists contain some households that now practise hay making Grass is the predominant material used for hay making, as reported by 61.5% of the respondents

Status

In progress

Funding

ILRI and IFPRI unrestricted core resources and GTZ

43: Economic impact of heartwater in the SADC region of Africa

Analysis

Ex ante economic impact

Dates

October 1997–May 1999

Input

B D Perry and B Minjauw (ILRI)

ILRI links

Biosciences Programme Epidemiology and disease control (project 7), University of Florida/USAID/SADC heartwater research (subproject A21N)

Objective

To assess in the Southern African Development Community (SADC) region the economic impact of heartwater and its control in production systems, the economic viability of vaccine control of heartwater and the potential market for such a vaccine

Methods

A participatory appraisal is being conducted of current strategies used to control heartwater in various livestock production systems. Databases will be developed of livestock production and marketing, heartwater control costs and livestock productivity effects. These will be used to quantify the economic impact of heartwater, evaluate the economic viability of vaccines in the control of heartwater and assess the potential market for such vaccines in the SADC region.

Status

The start-up consultations have been concluded. Appraisals are on-going in all the target countries and data are being obtained and analysed.

Funding

United States Agency for International Development

44· Genetic improvement of dual-purpose cowpeas in West Africa

Analysis

Ex ante economic impact

Dates

November 1997–September 1998

Input

P Kristjanson, P K Thornton, S Tarawali, J Smith (ILRI), International Institute of Tropical Agriculture (IITA) and Nigerian national agricultural research system collaborators

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Improving crop–livestock systems in subhumid sub-Saharan Africa and Asia (project 14), Improving crop–livestock systems in semi arid sub-Saharan Africa and Asia (project 15)

Objective

To produce a reliable estimate of returns to joint ILRI/IITA research aimed at improving the quality and quantity of cowpea fodder available to livestock in West and central Africa

Methods

Available biological response coefficients for the target production systems of the semi-arid and subhumid tropics of Africa are being assembled and applied to a herd simulation model to estimate herd productivity gains from the use of higher yielding dual purpose varieties of cowpeas. The impact of improved soil fertility (in part due to the increased nitrogen content of manure from cowpea fed cattle) and the reduction of attacks of *Striga* on cereal yields will be estimated. These productivity impact estimates will be used in an economic surplus model to estimate potential returns to this area of research.

Status

In progress

Funding

ILRI unrestricted core and project development funds

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45· Impact of improved management of mixed crop–livestock systems in semi-arid Africa

Analysis

Ex ante environmental impact

Dates

November 1997–December 1998

Input

P Kristjanson, P K Thornton, S Fernandez, T Williams and P Hiernaux (ILRI)

ILRI links

Sustainable Production Systems Programme Systems analysis and impact assessment (project 11), Improving crop–livestock systems in semi-arid sub Saharan Africa and Asia (project 15)

Objective

To produce a reliable estimate of the returns to research on livestock and natural resource management strategies for improving the productivity and sustainability of crop–livestock systems in semi-arid Africa. Poor nutrition is the main cause of the low productivity of ruminants in crop–livestock systems of semi arid West Africa. Opportunities to improve livestock nutrition in these systems include the development of supplementation techniques, the improvement of available dry season feeds such as crop residues and fodder trees and shrubs, and the identification of grazing management practices that can increase nutrient supplies to animals. Livestock play an important role in soil fertility maintenance in mixed farming systems of semi-arid West Africa through their manure and herds are managed to facilitate manure collection. Improved feeding strategies could also increase crop production by providing better quality manure and more efficient cycling of organic matter, nitrogen and phosphorus.

Work by ILRI's ecoregional team in the semi arid zone includes studies to evaluate (a) the influence of supplementary nitrogen and phosphorus on rumen function, forage intake, nutrient excretion and productivity of ruminants, (b) the effect of grazing management practices, such as timing and duration of grazing, on animal performance and nutrient excretion, and (c) the genetic variation in feed quality of crop residues and fodder trees/shrubs. Expected outputs include supplementation strategies that increase meat and milk production and improve the cycling of nutrients by livestock in mixed farming systems, grazing management practices that increase the supply of nutrients and improve livestock production, and improved feeding value and use of available crop residues and fodder trees/shrubs.

Methods

This study aims at quantifying the returns to ILRI's research in the semi-arid zone of West Africa. Existing secondary data are being used to define appropriate recommendation domains and to estimate adoption rates. Productivity impacts of recommended technologies and management practices will then be assessed.

Status

On going

Funding

ILRI unrestricted core

46· Impact of the ILRI-co-ordinated Small Ruminant Research Network

Analysis

Ex post social impact

Dates

January–December 1998

Input

M Smalley, P Kristjanson, P K Thornton (ILRI) and consultants

ILRI links

Strengthening Partnerships with NARS Programme (SPAN) Capacity development for strengthening NARS (project 20), Sustainable Production Systems Programme Systems analysis and impact assessment (project 11)

Objective

To assess the impacts of work of the Small Ruminant Research Network (SRNET) in eastern and southern Africa Anecdotal evidence suggests that SRNET has been successful in conducting training activities that have built expertise for small ruminant research and has leveraged funds from national agricultural research systems (NARS) for collaborative research within the NARS In 1997 there were more than 90 NARS scientists in 28 NARS institutions in eastern and southern Africa working on SRNET supported collaborative research projects More than 120 NARS staff have attended SRNET training Over a third of those trained by ILRI are now leading small ruminant teams in their countries associated with the network, a further third are members of network supported collaborative research teams The US\$ 1.2 million of network funds put into collaborative projects has leveraged over 2.5 times as much money from NARS institutes

Methods

There is need to conduct a formal and systematic assessment of SRNET impacts Appropriate instruments to do such an impact assessment are being sought Once identified, they and SPAN data will be used to determine the impacts of SRNET on capacity building within research priorities set by NARS partners and on NARS research funds, and effectiveness of constraint analysis carried out by NARS partners at the start of the last network cycle

Status

On going

Funding

ILRI unrestricted core and European Union

47: Impact of ILRI's graduate fellowship programme

Analysis

Ex post social impact

Dates

January–December 1998

Input

M Smalley, P Kristjanson, P K Thornton (ILRI) and consultants

ILRI links

Strengthening Partnerships with NARS Programme (SPAN) Capacity development for strengthening NARS (project 20), Sustainable Production Systems Programme Systems analysis and impact assessment (project 11)

Objective

To assess impacts of ILRI's graduate fellowship programme in sub-Saharan Africa over the last 20 years ILRI's graduate fellowship programme provided research experience for 301 scientists from national agricultural research systems (NARS) in 24 countries of sub Saharan Africa between 1978 and 1997 Graduate fellows are with ILRI for extended periods of up to three years as they complete their degree related research

Methods

This study will assess the impact of ILRI's graduate fellowship programme on NARS research It will focus on four or five countries in sub Saharan Africa that significant numbers of ILRI graduate fellows have come from A questionnaire has been sent to NARS to obtain information on the value and impact of having their staff members work towards higher degrees within ILRI research programmes as graduate fellows Survey data are currently being analysed

Status

On going

Funding

ILRI unrestricted core and European Union

48: Enhancing positive impacts of livestock on the environment

Analysis

Ex ante environmental impact

Dates

January 1998–December 2000

Input

R S Reid, P K Thornton, R L Kruska (ILRI), M Walsh, K Shepherd (International Centre for Research in Agro-forestry), D Campbell, D Skole (Michigan State University), M Coughenour, K Galvin, J Ellis (Colorado State University), J Olson (Ohio State University), S E Carter (International Development Research Centre) and J Lynam (Rockefeller Foundation)

ILRI links

Sustainable Production Systems Programme Livestock productivity under disease risk (project 18), Systems analysis and impact assessment (project 11)

Objective

To develop management recommendations that will help mitigate the negative and enhance the positive environmental impacts of livestock

Methods

Conceptual models of livestock, land use and the environment are being developed, and ways are being planned to build these conceptual models. The first East Africa land-use-change working group has been established and a financing plan is being developed. A feasibility analysis of a case study of pastoral impacts on dry woodlands in northern Kenya has been completed. Over the next three years, case studies, models and decision support tools will be developed that can provide local, national and international decision makers with better information so that livestock development activities are targeted more effectively and their impacts are better anticipated.

Status

On going

Funding

ILRI unrestricted core and United States Agency for International Development, other donor sources to be identified

Publications

Mworia J K, Mnene W N, Musembi D K and Reid R S 1997 Resilience of soils and vegetation subjected to different grazing intensities in a semi arid rangeland of Kenya *African Journal of Range and Forage Science* 14(1) 25-30

Thornton, P K and Jones, P G A Conceptual approach to dynamic land-use modelling *Agricultural Systems* 1998 57(3) 227-243

49: Impact of Vertisol technology adoption in the Ethiopian highlands

Analysis

Ex post economic impact

Dates

April–December 1998

Input

M A Jabbar, M A Mohamed Saleem, P K Thornton, P Kristjanson, S Ehui (ILRI), Hailu Beyene (Ethiopian Institute for Agricultural Research), Global 2000 and Ethiopian Ministry of Agriculture

ILRI links

Sustainable Production Systems Programme Improving crop–livestock systems in highland sub-Saharan Africa and Asia (project 13), Policy analysis of crop–livestock systems (project 12), Systems analysis and impact assessment (project 11)

Objectives

To determine adoption pathways and behaviour among users of the BBM technology package, to assess the impacts of this technology on output, income and human welfare, particularly poverty reduction and food security, and to identify constraints and opportunities for rapid diffusion of the technology Vertisols (heavy black clay soils) cover some 43 million ha or 19% of the total land area of sub-Saharan Africa About 30% of the Vertisol area is in Ethiopia and Eritrea, particularly in the highland zone Vertisols are productive soils but difficult to manage due to their poor internal drainage, as a result of which they are prone to flooding and waterlogging during the wet season Consequently, Vertisols in Ethiopia are used largely for dry season grazing While Vertisols remain underused, population pressures have pushed crop production and livestock grazing to steeper slopes, causing serious removal of vegetation and soil erosion Removing constraints to crop production in Vertisol areas would help improve food security, alleviate poverty and maintain the integrity of the natural resources The Joint Vertisol Project, a consortium of ILRI, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and several Ethiopian institutions, has developed a low cost and simple technology package to improve the use and productivity of Vertisols The package includes animal drawn drainage equipment dubbed a broadbed maker (BBM), improved crop varieties, fertiliser and other agronomic practices The BBM is used to construct broadbeds and furrows that allow excess water to drain away from the beds in the early rains Improved crop varieties can then be planted early Since 1992, the package has been extended widely by the Ethiopian Ministry of Agriculture in collaboration with Global 2000 and other non governmental organisations Private manufacturers of the BBM are also active in the diffusion After a slow start, over 15,000 BBMs have been distributed by various agencies in Ethiopia

Methods

A detailed analysis of the adoption of the BBM and its impact will be carried out. This information will be used to design further diffusion strategies to facilitate rapid adoption by farmers. Secondary data will be collected from the Ministry of Agriculture and NGOs diffusing the technology. A survey will be conducted in selected sites to collect primary data. Econometric analyses will be done to determine adoption pathways and related factors, particularly impacts of adoption on poverty alleviation at the household level. The economic surplus model will be used to assess impact and rates of return to the research expenditure.

Status

Not yet started

Funding

ILRI unrestricted core and, possibly, CGIAR Impact Assessment and Evaluation Group

50: Economic impact of disease—feed-interaction-based technologies on smallholder dairy production in West Africa

Analysis

Ex ante economic impact

Date

May–December 1998

Input

K Agyemang, J W Smith, P Kristjanson, A Larbi, P K Thornton, S Tarawali (ILRI) and collaborators from national agricultural research systems (NARS) in Ghana, Nigeria, Mali, Côte d'Ivoire and The Gambia

ILRI links

Sustainable Production Systems Programme Smallholder dairy project (project 19), Improving crop–livestock systems in subhumid sub Saharan Africa and Asia (project 14), Systems analysis and impact assessment (project 11), Strengthening partnerships with NARS Programme (SPAN) Capacity development for strengthening NARS (project 20), Biosciences Programme Epidemiology and disease control (project 7)

Objectives

To produce reliable estimates of returns to controlling internal and external parasitism (helminths and ticks) in milking herds, joint supplementary feeding and helminth control, and herbaceous forage legumes from feed gardens Over the past three years a series of pilot on farm experimental studies has been undertaken in locations on agro-ecological transects in Nigeria, with similar studies being done in Mali, Senegal, Ghana and northern Nigeria The completed pilot studies have all shown high benefit–cost ratios for both dry season supplementation and the control of diseases The economic impact of these technologies on the nearly 14 million milking cows in West Africa needs to be estimated

Methods

Data on cattle distribution (disaggregated by genotypes) at district or regional levels in selected countries, frequency and cost of controlling helminths (as measured by deworming) and ectoparasites (as measured by dipping) are being gathered for analysis in a geographic information system This will enable a better definition of the recommendation domains for these technologies

Status

In progress

Funding

ILRI unrestricted core and project development funds

Publications

Agyemang K , Smith J W and Larbi A 1997 Dairy response to feed supplementation and helminth control in indigenous cattle in West Africa A case study from Nigeria *Journal of Dairy Science* (Suppl) 80 231

Agyemang K , Tona G , Smith J W and Larbi A. 1998 Estimation of dairy response curves of indigenous cattle in West Africa Bunaji Cattle *Journal of Dairy Science* (Suppl) 81 (in press)

51: Cost of major livestock diseases in Latin America and the Caribbean

Analysis

Ex ante economic impact

Dates

June 1998–May 2000

Input

P Kristjanson, B D Perry, J McDermott, P K Thornton, F Holman, C Leon-Velarde (ILRI), national agricultural research systems, the International Center for Tropical Agriculture (CIAT) and R McLeod (consultant)

ILRI links

Sustainable Production Systems Programme Improving crop–livestock systems in Latin America and the Caribbean (project 16), Systems analysis and impact assessment (project 11), Biosciences Programme Epidemiology and disease control (project 7)

Objective

To improve decision-making in resource allocations for livestock research to benefit the Latin American and Caribbean region by identifying the major livestock diseases and their locations in the region and by estimating the economic costs of these diseases. Diseases continue to constrain livestock production and mixed farming systems in developing countries. Control of livestock diseases is hampered by lack of vaccines, drug resistance, improper management, poor animal health services and poor delivery systems for animal health products. Annual losses due to ticks and tick-borne diseases globally have been estimated at US\$ 7 billion, and potential gains from trypanosomiasis control in sub-Saharan Africa in terms of meat and milk production are estimated to be between US\$ 420 million and US\$ 1.1 billion per year. Estimation of the costs of tick-borne diseases in Latin America and the Caribbean, using methodologies similar to those employed in Africa and Asia, will provide a basis for development of a priority ranking for livestock diseases globally and allow quantitatively based research prioritisation for animal diseases.

Methods

An ILRI spreadsheet model (TICKCOST) will be used to collate data on the incidence and costs of livestock diseases by production system and country or region. Readily available data on the incidence of the various diseases, mortality rates, morbidity rates and impact on key productivity indicators in the livestock sector of Latin American countries will be collated. Information on the costs of control of each disease will also be collected. The information generated will allow a priority ranking of the major livestock diseases in Latin America. Together with data being gathered by

ILRI and its collaborators in Asia this information will also be used to estimate the relative costs of these diseases globally The end results should be indicators of research investments and outputs that will have the largest impact on the livelihoods of livestock producers and consumers

Status

Not yet started

Funding

ILRI unrestricted core and project development fund, other donors yet to be identified

52: Methods to assess the impacts of livestock technologies on household welfare

Analysis

Methodology development

Dates

June 1998–June 1999

Input

S J Staal, P Kristjanson (ILRI), D Sheikh, C Valdivia and M Bredahl (University of Missouri–Columbia)

ILRI links

Sustainable Production Systems Programme Market-oriented smallholder dairy (project 19), Systems analysis and impact assessment (project 11)

Objective

To develop indicators of economic well being and food security for assessing impacts of livestock production on Kenyan households Traditional impact assessment methods have tended to measure benefits through simple productivity or income effects Many of the benefits of livestock-keeping, however, are thought to accrue from reduced risk to household food security It is therefore proposed in this ILRI/University of Missouri (Columbia) joint study to develop indicators of economic well being and food security to be incorporated in the impact assessment

Methods

Income variability, coping strategies during lean times, consumption of food, human capital investment and changes in the level of assets are anticipated benefits of livestock which need to be evaluated The nature of consumption decisions as related to gender will also be examined Econometric estimation techniques in the form of fixed-effects models will also be used The methodology thus developed will be relevant and applicable to ILRI research across ecoregional sites and systems and the study is expected to foster links for long-term collaboration with ILRI's dairy research team

Status

Not yet started

Funding

Proposal submitted to the United States Agency for International Development

53: Effect of ruminant livestock technologies on the welfare of women and children

Analysis

Ex post social impact

Dates

June 1998–June 1999

Input

B I Shapiro and P Kristjanson (ILRI)

ILRI links

Sustainable Production Systems Programme Crop–livestock systems in the highlands of sub Saharan Africa and Asia (project 13), Crop–livestock systems in subhumid sub Saharan Africa and Asia (project 14), Crop–livestock systems in semi arid sub-Saharan Africa and Asia (project 15), Systems analysis and impact assessment (project 11), Market-oriented smallholder dairy (project 19), Policy analysis (project 12)

Objectives

To review past research on the links between gender issues and ruminant livestock production and to provide capacity for institutionalising gender research in ILRI systems research through gender analysis training and technical assistance for researchers and collaborators in national agricultural research systems

Methods

This study is conceptualised within the framework of the CGIAR System wide Program on Participatory Research and Gender Analysis. It is intended that this project be carried out in two-phases. Phase one will consist of a comprehensive global review of past research on the links between gender issues and ruminant livestock production and preparation of two in depth case studies suitable for use as educational materials. Phase two will involve the establishment of an ILRI subproject to carry out reviews on an ongoing basis to ensure that gender issues and analysis are fully incorporated in ILRI systems research. This will require introductory training and follow-up workshops, technical assistance, preparation of training materials and dissemination of ILRI and partner research results on gender and livestock. Some of the issues to be critically addressed will include determination of gender needs, gender-specific performance indicators, gender surveys and instruments of data collection and analytical techniques.

Status

Not yet started

Annex: Programme–project matrix for impact and adoption assessments

	Assessment number*																											
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
ILRI projects																												
Biosciences Programme																												
1 Animal Genetic Resources																												
2 Development of Disease Resistant Livestock																												
3 Pathogenesis and Disease Resistance																												
4 Immunology and Vaccine Development																												
5 Development of Sub-unit Vaccines																												
6 Epidemiology and Diagnostics																												
7 Epidemiology and Disease Control				√	√							√	√			√	√	√		√				√	√	√	√	√
8 Feed Improvement															√							√						
9 Rumen Ecology																												
10 Forage Genetic Resources																												
Sustainable Production Systems Programme																												
11 Systems Analysis & Impact Assessment				√													√			√		√				√	√	√
12 Policy Analysis											√									√		√						
13 Highland Systems in SSA and Asia			√						√	√				√	√				√			√						
14 Subhumid Systems in SSA and Asia						√	√		√																			
15 Semi arid Systems in SSA and Asia											√																	
16 Crop-livestock Systems in LAC																												
17 Crop-livestock Systems in WANA																												
18 Livestock Productivity under Disease Risk	√	√														√					√					√	√	√
19 Smallholder Dairy Systems			√		√			√		√				√			√						√					
SPAN																												
20 Strengthening NARS																												

* See summary table, pp 3–6 for titles

Linkages for activities started before 1995 are approximated within the current ILRI programme–project structure

	Assessment number*																									
	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
ILRI projects																										
Biosciences Programme																										
1 Animal Genetic Resources					√																					
2 Development of Disease Resistant Livestock					√																					
3 Pathogenesis and Disease Resistance																										
4 Immunology and Vaccine Development												√														
5 Development of Sub-unit Vaccines												√														
6 Epidemiology and Diagnostics																										
7 Epidemiology and Disease Control	√										√	√			√								√	√		
8 Feed Improvement						√			√																	
9 Rumen Ecology																										
10 Forage Genetic Resources																										
Sustainable Production Systems Programme																										
11 Systems Analysis & Impact Assessment		√		√	√	√	√	√	√		√	√	√	√			√	√	√	√	√	√	√	√	√	√
12 Policy Analysis															√							√				√
13 Highland Systems in SSA and Asia		√									√											√				√
14 Subhumid Systems in SSA and Asia								√									√						√			√
15 Semi arid Systems in SSA and Asia								√						√			√	√								√
16 Crop-livestock Systems in LAC																								√		
17 Crop-livestock Systems in WANA																										
18 Livestock Productivity under Disease Risk			√								√	√										√				
19 Smallholder Dairy Systems		√		√		√	√		√														√		√	√
SPAN																										
20 Strengthening NARS		√																	√	√			√			

* See summary table, pp 3-6 for titles

Linkages for activities started before 1995 are approximated within the current ILRI programme-project structure