Evaluation of the CGIAR Research Program on Livestock and Fish

Volume 2– Annexes

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Anni McLeod (Team Leader)
Paolo Ajmone Marsan
Rex Dunham
Julie Fitzpatrick
John Morton
Peter Udén
Felix von Sury

CGIAR
Independent Evaluation Arrangement

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ANNEX A: L&F Evaluation timeline

MAIN EVENTS	PERIOD/DATE	ACTIVITIES	PEOPLE INVOLVED
PREPERATORY and INCEPTON PHASE	**Jul – Mar 2014**		
Preparatory Phase		• Finalizing ToR • Recruitment of Evaluation Team • Establishment of Reference Group	IEA
1st RG consultation	29 Sep 2014	• Feedback on draft ToR	RG + IEA
Attendance of SPAC and PPMC meetings, Uganda	7-11 Dec 2014	• Observing SPAC and PPMC meetings • Orientation into IEA evaluation process and agenda • Interaction with L&F key governance and management body members	TL
Inception meeting, Kenya	1 – 7 Feb 2015	• Work on evaluation methodology • Further work on the Inception Report • Briefing on L&F program and interaction with L&F and ILRI management	IEA + ET + L&F
2nd RG consultation	24 Mar 2015	• Feedback on draft Inception Report	RG + TL + IEA
Final inception report	Apr 2015	• Final inception report published on IEA homepage	IEA
INQUIRY PHASE	**Mar – Aug 2015**		
Field visits		Key points covered:	
• WorldFish HQ in Malaysia and Bangladesh	1 – 8 Apr 2015	• Interaction with WF researchers and management • View WF research facilities and trials	Rex Dunham John Morton
• Ethiopia	27 May – 6 Jun 2015	• Interaction with ICARDA and ILRI researchers and value chain team • Visit community-based sheep and goat Breeding groups in three different villages • Interactions with key partners (local and national level)	Paolo Ajmone Marsan John Morton
• Tanzania	25 May – 2 Jun 2015	• Interaction with ILRI and CIAT scientists (both, Tanzania and Kenya based through skype) and value chain team • Attendance of 5th Dairy Development Forum meeting • Visit “Milk Week” showground • Interactions with key partners (local and national level)	Anni McLeod Peter Uden
• CIAT HQ in Colombia and Nicaragua	6 Jul – 15 Jul 2015	• Interaction with CIAT researchers and management	Anni McLeod Peter Uden

		• View CIAT research facilities and trials • Interaction with L&F value chain team • Visit two research sites • Interactions with key partners (local and national level)	
• Vietnam	25 Jul – 3 Aug 2015	• Interaction with ILRI scientists and value chain team • Visit two main clusters if research sites • Interactions with key partners (local and national level)	Anni McLeod Julie Fitzpatrick
Research staff survey	Aug – Sep 2015	• Design and piloting of survey • Conduct of survey	ET + IEA
Desk review for Discovery Flagship case studies	Aug – Sep 2015	• Review documentation on selected cases • Conduct interviews (were necessary) • Draft case study reports	ET
Interviews	Apr – Sep 2015	• Interview key global partners, external peer and stakeholders	ET
ANALYSIS AND REPORTING PHASE	**Aug - Dec 2015**		
Bibliometric analysis	Aug 2015	• Citation, journal frequency and H index analysis	IEA
Publication review	Aug 2015	• Qualitative assessment of sample publications	ET
Writing workshop in Rome	5 – 9 Oct 2015	• Review main evidence • Identify main findings and information gaps • Prepare report drafting	ET + IEA
Drafting of report	Oct - Dec 2015	• Drafting of evaluation report	ET
3rd RG consultation	Dec 2015	• Presentation of draft report (main findings, conclusions and recommendations)	RG + TL + IEA
Feedback and comments	4 – 22 Dec 2015	• L&F management and RG provide feedback and comments •	L&F +RG
Incorporation of comments	2 – 15 Jan 2016	• Review and revisions of draft report	TL +IEA
Final Evaluation Report	25 Jan 2016	• Final Evaluation Report	IEA
L&F management response		• L&F management response	L&F
CO management response		• CO management response	CO
Submission of report		• IEA submits final report incl. Management responses to the FC	IEA
Dissemination phase		• Communications products	CCAFS + TL + IEA

ET= Evaluation Team, TL = Evaluation Team Leaders, RG= Evaluation Reference Group

ANNEX B: Evaluation Team Profiles

Team leader: Anni McLeod

Dr. Anni McLeod has an MSc in Agricultural Economics, an MBA, and a PhD in Agriculture. She is an independent consultant based in Edinburgh, UK, who specialises in livestock economics and policy and the management of organisations and projects. She has worked for 30 years with governments, international agencies and research systems worldwide. For seven years Anni was the Senior Livestock Policy Officer in the Animal Production and Health Division of FAO, where her portfolio covered many aspects of livestock sector analysis, policy advice and organisational strategy. She managed the socio-economics programme for the Emergency Centre for Transboundary Animal Diseases, which advised on compensation strategies for avian influenza and the socio-economic impacts of disease control strategies. She also co-led FAO's culture change initiative and contributed to the strategy for the gender programme. Until 2003 she was a staff member of PAN Livestock Services and the Veterinary Epidemiology and Economics Research Unit at the University of Reading, carrying out consultancies and field research in Africa, Asia, Latin America and the UK. For four years she was based at the Kenya Agricultural Research Institute as leader of the socio-economics skills group for a DFID-funded project.

Anni's consultancy work since leaving FAO has included a wide range of issues within the livestock sector. She is currently a peer reviewer for the British Biotechnology and Biological Sciences Research Council's Zoonoses in Emerging Livestock Systems programme and a member of its independent advisory group. She contributed to the review of extension proposals of CGIAR research programmes conducted by the Independent Science and Partnership Council.

Team members

Paolo Ajmone Marsan

Dr. Paolo Ajmone Marsan received has a MA in Agriculture and a "Scuola di Specializzazione" Degree in Applied Genetics from the University of Milan. He is currently Full Professor of Animal Breeding and Biotechnology and Director of the Institute of Zootechnics and of the Proteomics and Nutrigenomics Research Center - PRONUTRIGEN of the Università Cattolica del S. Cuore, in Piacenza. In his career he has been Research Fellow for seven years at the Experimental Institute for Cereal Crops, in Bergamo and visiting scientist at Applied Biosystems Inc. in Foster City, California, Keygene N.V. in Wageningen, The Netherlands and Escagenetics Corporation, S. Carlos, California, USA. He participated in several national and international research projects on the use of molecular genetics in animal breeding and biodiversity, twice as a coordinator of EU Consortia.

Julie Fitzpatrick

Dr. Julie Fitzpatrick has a BA in Veterinary Medicine from University of Glasgow, a PhD in Faculty of Medicine from the University of Bristol and a MA in Epidemiology from the University of London, is the Scientific Director of the Moredun Research Institute and Chief Executive of the Moredun Foundation. She also holds a Chair in Food Security in the College of Medical, Veterinary and Life Sciences at the University of Glasgow. Julies research interests focus on livestock health and disease in the UK and in developing countries. Julie is a member of the Royal College of Veterinary Surgeons Research Committee and is also Vice-Chair of the Board of GALVmed, a public private partnership focusing on supporting the development of biologicals and therapeutics for orphan diseases in developing countries. She is also a member of the BBSRC'S Food Security Strategic Advisory Panel and of The Wellcome Trusts' Veterinary Fellowship Panel. In 2003 Julie was awarded the G Norman Hall Medal for research into animal diseases by the RCVS Trust.

Rex Dunham

Dr. Rex Dunham has a BS in Ecology, Ethology and Evolution from the University of Illinois and a MS and PhD in Fisheries and Allied Aquacultures from Auburn University. He is currently a Professor in the School of Fisheries, Aquaculture and Aquatic Sciences at Auburn University, USA. Rex has 38 years of experience in the area of Aquaculture and Fisheries Genetics. He lived for two years in the Philippines where he served as the Program Leader/Senior Scientist, Genetic Enhancement and Breeding Program, International Center for Living Aquatic Resources Management. His areas of expertise include quantitative genetics and selective breeding, genetic biotechnology, genetic engineering, genomics, population genetics, aquaculture and reproduction. He has directed research projects in the USA, Philippines, Vietnam, Indonesia, Thailand, China, Bangladesh, India, Egypt, Ghana and Ivory Coast. Rex has been a consultant, taught, or served on review teams and panels in the USA, Canada, Philippines, Brazil, Taiwan, India, Indonesia, Spain, Italy and Vietnam. Rex has published more than 320 scholarly works, including 166 peer reviewed journal articles as well as refereed symposium papers, book chapters and major reports.

John Morton

Dr. John Morton has a BA from the University of Cambridge and a PhD from the University of Hull, both in social anthropology, the latter for a study of semi-nomadic pastoralists in north-eastern Sudan. He has worked for 22 years at the Natural Resources Institute of the University of Greenwich, where he is now Professor of Development Anthropology and Head of the Livelihood and Institutions Department. John has extensive experience in research and consultancy on social, institutional and policy aspects of livestock development for a variety of international donors, working in pastoral, mixed-crop livestock and smallholder dairy systems. From 1995 to 2006 he was Socio-Economic Adviser, then Regional Dissemination, Promotion and Uptake Co-ordinator, for DFID's Livestock Production Research Programme. Recent work includes responsibility for the institutional and policy component of DFID's impact assessment and learning from the Ugandan Stamp Out Sleeping Sickness Campaign, being Team Leader of DFID's Strategic Review of the Democracy, Growth and Peace for Pastoralists Project in Ethiopia, and being a Team Member for the Strategic Overview of Livestock Research Undertaken by the CGIAR. John also has expertise on climate change impacts and adaptation and was Co-ordinating Lead Author for the Chapter on Rural Areas of the IPCC's Fifth Assessment Report.

Peter Udén

Dr. Peter Udén received his PhD from Cornell University 1978 in Animal Science/Animal Nutrition and became senior lecturer 1980 at the Department of Animal Nutrition and Management at the Swedish University of Agricultural Sciences (SLU). In 1992, he also became an Associate Professor at the Department. Between 2007 and 2015, he was the Head of the Feed Science Division within the Department but is presently employed at 20% of full time by the University.

He has written some 100 research articles and also been Editor in Chief for some 10 years for the Animal Feed Science and Technology journal. In the area of animal nutrition, he has worked with the study of feed resources in Sweden, Tanzania and Vietnam while supervising PhD students in their sandwich programs at SLU. Peter has also supervised MSc students from countries such as Tanzania, Ethiopia, Zimbabwe, Zambia and Vietnam.

Felix von Sury

Dr. Felix von Sury is a pasture agronomist by training and has a PhD in Agricultural Science from ETH Zurich. Felix has extensive experience in international and development cooperation. He served for 13 years in the SDC, Swiss Agency for Development and Cooperation, Swiss Foreign Ministry. In the 1990 he was Programme Officer in the SDC Agricultural Service looking after a variety of research programmes, also of the CGIAR. Later he became SDC's Country Director for Nepal and Division Head for Eastern Europe. From 2000 until 2011 he was Executive Director of Intercooperation, a major Swiss development NGO active mainly in the fields of renewable natural resources, agriculture, forestry and climate change. Long-term assignments have taken Felix to Peru, Australia, India and Nepal. Since 2012 he has been a freelance consultant and led and participated in several evaluations and reviews, among others of the Bolivian Agricultural Innovation and Services Programme, PISA, and of the AAS CRP. Felix is an independent expert for the Research for Development Programme of the Swiss Science Foundation; he sits on the Stakeholder Committee of the Swiss Aquatic Research Institute and is a member of the Board of the International Institute for Sustainable Development, IISD.

ANNEX C: Evaluation questions

Evaluation questions were defined in the inception report and used by the team to guide the investigation.

Overarching questions

These were of two types. The majority of them focussed on the performance of the current programme:

1. Is the maxim "more meat, milk & fish – by & for the poor" credible and realistic? Two sub components of this question will be explored:
    a. Does experience to date substantiate L&F's objective to "increase productivity of small-scale livestock and fish systems so as to increase availability and affordability of meat, milk and fish for poor consumers and, in doing so, to reduce poverty through greater participation by the poor along animal source food value chains"?
    b. Is it appropriate and useful to conflate the two objectives of improved nutrition and improved livelihoods?
    c. How well is the programme addressing the issue of upscaling and outscaling its research outputs?
2. CRP Flagship coherence: is there a valid, demonstrable and logical contribution of the discovery flagships to the broader value chain-centred delivery flagship, and vice versa? Sub components of this question are:
    a. Does the delivery flagship articulate and communicate demand for research to the discovery flagships?
    b. Do the discovery flagships adequately capture demand articulated in the delivery flagship?
3. Does L&F have sufficient capacity (in all senses) to deliver on the promise of a value chain approach to enhancing the roles of livestock and fish?
4. What has been the added value (if any) of integrating previous livestock and fish research programmes into the CRP?
5. Does L&F have the appropriate partners for research on value chains, and is it using the right partnership models and principles?
6. How is gender explicitly integrated into the CRP to enhance impact?
7. To what extent has L&F leveraged capacity across the CGIAR centres?
8. How does L&F contribute to global poverty reduction through livestock and fish research?
9. How well has L&F delivered to date against planned outputs?

10. To what extent do governance and management arrangements in L&F help it to reach its SLOs and IDOs?

Three questions addressed the relevance of the programme portfolio to the global context of livestock and fish research discussed in section 2.2. These questions anticipate the call for the second round of CRPs.

11. Does L&F adequately cover poultry research (given the documented demand, nutritional value and opportunities offered by poultry)?
12. Does L&F adequately cover NRM and environmental issues associated with livestock and fish that are not captured within other CRPs?
13. Does L&F adequately cover post-harvest opportunities for value addition and loss avoidance that are not captured by livestock and fish research in other CRPs?

Questions against standard IEA evaluation criteria

Relevance

1. What is the relevance of the L&F portfolio, research products and development outcomes to global development issues identified in section 2.2 and in overarching questions 1, 2, 11, 12, and 13?
2. How well do L&F objectives and impact pathways respond to the needs of users and beneficiaries of the CRP research products? In particular, does L&F respond to the development challenges and opportunities faced by small-scale livestock and aquaculture systems?
3. What is the relevance of the current animal health, livestock and fish genetics and livestock and fish feeds flagship portfolios to value chain transformation for scaling in each of the study sites?
4. What is the relevance of the value chain approach to livestock research and development strategies of the countries and regions hosting case studies?
5. How relevant are the current partnerships to achieving the anticipated outcomes? [also relevant to Partnerships under Cross-cutting issues]
6. How relevant is the L&F portfolio and approach to more equitable gender and social impacts at different levels? [see also Gender under Cross-cutting issues]
7. How coherent and consistent are L&F's objectives with the main goals and SLOs presented in the CGIAR's SRF?

Quality of Science

1. Does L&F provide an adequate and appropriate framework for delivering high quality research? How are the standards for such a framework set?
2. What are the key research outputs and outcomes of L&F and how is the quality of products assured?

3. Has there been any change (improvement, deterioration) in research output quantity and/or quality compared to pre-CRP research, and if so, what has influenced this?
4. Which are the areas of research and research processes which present the greatest opportunity for improving research quality, and how can this be achieved?
5. What actions have been, or are being taken to address research quality on an ongoing basis?

Effectiveness

1. To what extent does the L&F Theory of Change provide an adequate framework for effective programme delivery? How is it being used by the L&F management team and research team leaders as a tool for strategy and management?
2. To what extent were the planned outputs and outcomes achieved or are likely to be achieved?
3. If there were differences in the performance of different types of programme activities (Flagships), or across value chains, what caused them and what lessons can be learned from this, and what mechanisms are in place to accommodate such lesson-learning?
4. What kind of factors influenced L&F's implementation positively or negatively?
5. To what extent has the funding structure helped or impeded effectiveness? What lessons can be learned? [also relevant to governance and management]
6. Are there any programme elements or activities that should be modified, discontinued or added to improve L&F's effectiveness?
7. What factors have influenced the achievement or non-achievement of legacy activities?
8. How have the activities' objectives and strategies evolved, if they have, in response to (a) learning from experience, and (b) emerging risks and opportunities?

Efficiency

1. To what extent have clear lines of communication been established between discovery and delivery flagships that promote the efficient use of research expertise and sharing of results?
2. Is there evidence that capacity is being leveraged across centres, value chains and flagships?

Impact

1. How effective is the current L&F Theory of Change in defining the programme's expected impact and how valid is the logic behind it?
2. What are the key legacy projects currently operating under the different flagships? What impact have these had, in terms of development, partnership, knowledge brokering, scientific advancement, etc.? How have these impacts been exploited?

3. To what extent does L&F's Theory of Change adequately address the challenge of scaling up or out research outputs generated by the programme?
4. With specific reference to the selected value chains, what is the potential to scale up or out research outputs generated in the delivery flagship?
5. What has been the response of the CRP to the conclusions (see ANNEX B) of the ISPC White Paper on livestock research across the CGIAR of January 2014? In particular the role of cross-CRP dialogue and collaboration, and the identified gaps and enhancing impact in the area of post-harvest losses in each of the commodities chains.

Sustainability

1. To what extent have results and impacts from legacy research been sustained, and what does this imply for future sustainability? Are there already indications that research outputs are being adopted by boundary partners, scaled-up or are influencing policy?
2. To what extent did L&F anticipate the challenges of sustainability in programme design, choice of partners, funding, etc., and how effective have any sustainability-targeted measures been?
3. How well has the institutional and human resource capacity of beneficiary countries been taken into account in partnerships, capacity building initiatives, leadership roles, etc.?
4. What are the key functions and processes that will improve sustainability of emerging research products, and who are the key actors that have or will contribute to this?

Cross cutting issues

Partnerships

1. What are the fundamental principles of the L&F partnerships strategy? How has the partnership strategy affected the evolving CRP design, and how has the effectiveness of partnerships been measured?
2. What are the deliberate approaches and practices deployed for effective partnerships?
    a. How are partners identified?
    b. Are partnership principles and practices consistent with commitment to sustainability
    c. How are the relationships between the CG centres and their NGO and private partners managed?
3. How effective is the partnership with governments in each of the study countries, and how well is the L&F programme aligned with government policies and strategies? Are there any areas of major disagreement, and if so, how have these been handled?
4. To what extent are the L&F's partnerships being designed to increase the sustainability of the programme deliverables, and what lessons are being learned from this?

5. How cost-effective are L&F's partnerships? Does investment in partnerships add value, and if so, how is this measured?
6. What is the connection between L&F's partnerships and the sustainability of products, impacts and outcomes?

Capacity building

1. Do the capacity building activities of L&F respond to identified needs of the key stakeholders? What are these, how were they identified, and how effective has the response been?
2. What is the comparative advantage of L&F in the capacity building initiatives it has fostered? How can this be further improved?
3. How do L&F's capacity building activities affect programme effectiveness?
4. How do the L&F capacity building initiatives affect the adoption of the programme's products, impacts and outcomes?

Gender

1. How relevant are the approaches (research theme versus cross-cutting issue) suggested by the L&F gender strategy? What are the potential advantages and disadvantages of removing gender as a separately identified theme?
2. How has gender been operationally mainstreamed within L&F?
3. Is the composition of the L&F team adequate for the work to be done, with respect to experience and gender balance?
4. Has gender-specific research been effective? What have been the products? Are results and products being used across flagships? [also relevant to effectiveness]
5. What have been the outputs and outcomes of the gender strategy? What impacts have these had on development outputs and outcomes?

Environment and Natural Resource Management

1. Does IDO 5 (lower environmental impacts per unit of commodity produced) require rewording?
2. By what institutional mechanisms does the CRP ensure it works towards IDO5 (or a reworded version), in Flagships and value chains? How could these mechanisms be improved?
3. What are the research areas which best demonstrate positive achievements or the potential for positive achievements?

Organizational Performance: governance and management

1. Do the governance and management arrangements and functions, including the lived reality, conform to the programme partnership requirements of independence, accountability, transparency, legitimacy, and fairness, effectiveness and efficiency?

2. Have the governance and management structures and procedures been able to take into account risks related to the CRP implementation?
3. Are the programme management arrangements as they are described and implemented, inclusive, transparent, coherent, consistent, efficient and effective and do they contribute to learning?
4. Are the financial management structures and procedures transparent, safe, timely, consistent and effective? Do they take into account the multi-source and multi-fund-allocation nature of the CRP and its relationship with other CRPs and Centres?
5. Are the human resources management arrangements as they are described and lived equitable and fair, transparent, efficient and consistent and are they conducive to continuous learning? Do they take into account the multi-centre, multi-location and multi-disciplinary nature of the CRP?
6. Are staff and consultant recruitment and procurement processes efficient and transparent?

ANNEX D: List of people interviewed

Name	Position	Organization	Country/ies
Abdul Alim	Owner	Carp hatchery	Bangladesh
Abdullah Al Masum	Manager	WorldFish	Bangladesh
Abergelle Research team	n/a	Abergelle Agricultural Research Center	Ethiopia
Abut Bakar, Khairul Rizal	Research Assistant (Aquaculture & Genetics)	WorldFish	Malaysia
Adrian Bollinger	n/a	CIAT	Vietnam
Afrina Chowdhury	Gender specialist	WorldFish	Bangladesh
Aichi Kitalyi	Chair	Tanzania Dairy Board	Tanzania
Aimable Ntukanyagwe	Country Programme Officer Rwanda (formerly involved in MilkIT project)	IFAD	Tanzania
Alain Dehove	Coordinator of the OIE World Animal Health and Welfare Fund	FAO	n/a
Alan Tollervey	involved in managing DFID funding to the CGIAR	DFID	n/a
Alejandra Mora	Gender Specialist	CIAT	Nicaragua
Alessandra Galié	Gender specialist	ILRI	Tanzania
Alhaj Firoj Khan	President	Carp hatchery Association Jessore	Bangladesh
Alhaj Sk. Mejbah Uddin	Vice President	Carp hatchery Association Jessore	Bangladesh
Alison Ngeny-Otieno	Internal Auditor	CGIAR IAU	Kenya
Aluna Chawala	MSc Animal Science	TALIRI	Tanzania
Amirul Hoque	Member	Carp hatchery Association Jessore	Bangladesh
Amos Omore	Veterinary Epidemiologist and Team Leader	ILRI	Tanzania
An Notenbaert	Flagship leader – SASI	CIAT	Tanzania
Andrew Thorne-Lyman	Senior Nutrition Specialist (Aquaculture)	WorldFish	Malaysia

Andy Peters	SPAC member	Global Alliance for Livestock Veterinary Medicines	n/a
Angello Mwilawa	n/a	TALIRI	Tanzania
Anna Lacasta	Post-doctoral scientist	ILRI	Kenya
Anne Liljander	molecular cell biologist	ILRI	Kenya
Annet Mulema	Gender integrated and transformative research in SR VC in Ethiopia	ILRI-Ethiopia	Ethiopia
Antonio Rota	Senior Technical Advisor on Livestock and Farming Systems	IFAD	n/a
Asrat Tera	Livestock Research Director	South Agricultural research Institute (SARI)	Ethiopia
Aster Tsige	Head HR Department	ILRI Addis Abeba	n/a
Aung Tun Aye	consultant of feed mills	n/a	Bangladesh
Ayele Abebe	National sheep research coordinator	Debre Birhan Research Center	Ethiopia
Aynalem Haile	Small ruminant breeder, coordinator of the NARS researcher network	ICARDA Ethiopia	Ethiopia
Azage Tegegene	Project Coordinator	LIVES, ILRI-Ethiopia	Ethiopia
Badrul Alom	Technical specialist	WorldFish	Bangladesh
Barbara Rischowsky	ICARDA focal point and PPMC member	ICARDA	several
Barbara Szonyi	Post Doc food safety	ILRI – Safe Food Fair Food Project, Ethiopai	Ethiopia
Barbara Wieland	Team Leader Herd Health	ILRI	Kenya and Ethiopia
Ben Lukuyu	Feed Scientist	ILRI	Tanzania
Benjamin Belton	Senior scientist	WorldFish	Bangladesh
Benoy Barman	Senior scientist	WorldFish	Bangladesh
Berhanu Gebremeddin	Research Coordinator	LIVES, ILRI Ethiopia	Ethiopia
Birthe Paul	Farming systems scientist	CIAT Nairobi	n/a
Blake Ratner	Research Director	WorldFish	Malaysia
Bryan Mendieata	Director of external co-operation	UNA	Nicaragua
Carlos Zelaya	Researcher	CIAT	Nicaragua

Carmen Thoennissen	Fund Council and presently also donor rep in the Consortium Board	SDC	n/a
Catherine Kilelu	Postdoctoral Scientist	Wageningen University and ILRI	Tanzania
Catherine Pfeifer	Scientist, GIS-specialist	ILRI	Kenya
Charlie Crissman	Discipline director (Policy, Economics and Social Science)	WorldFish	Malaysia
Chau Minh Long	Researcher in cross-CRP project	WASI	Vietnam
Chin Yee Chan	Research Analyst (Policy, Economics and Social Science)	WorldFish	Malaysia
Claire Loy	Discipline Assistant (Aquaculture & Genetics)	WorldFish	Malaysia
Cova Arias	Professor, Aquatic Microbiology	Auburn University	n/a
Craig Meisner	Country Director	WorldFish	Bangladesh
Curtis Lind	Scientist (Genetics)	WorldFish	Malaysia
Cynthia McDougall	Senior Scientist (Gender)	WorldFish	Malaysia
Dagmawi Habte-Selassie	Program and partnership officer	IFAD	Ethiopia
Deogratius Mlay	Service Dept. Manager	Dairy Tech	Tanzania
Diane Schohet	Director of Communications and Marketing	WorldFish	Malaysia
Diane Willis	Director of People and Organizational Development	WorldFish	Malaysia
Diego Tobar	Livestock and Environment program	CATIE	Nicaragua
Dieter Schillinger	Trustee of ILRI Board	Independent Consultant	n/a
Don Dagoberto Diaz	Farmer	n/a	Nicaragua
Don Dagoberto Diaz and 4 others	Farmers	n/a	Nicaragua
Edgar Twine	Post-Doctoral Fellow – Value Chain Economist	ILRI	Tanzania
Edward Okoth	Scientist (ASF Coordinator) and Institutional Veterinarian	ILRI	Kenya
Ekramul Kabir Pintu	Organizing Secretary	Carp hatchery Association Jessore	Bangladesh
Elena Figus	Associate Director	CGIAR IAU	Kenya

Emdadul Haque	Member	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Enamul Huq	Chief Scientific officer	Bangladesh Fisheries Research Institute, Coxsbazar Station	Bangladesh
Ewa Wredle	Senior Lecturer Department of Animal Nutrition and Management Division of Ruminants, Nutrition and Management	Swedish University of Agricultural Sciences (SLU),	Sweden
Faraji Masudul	Member	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Fred Unger	PigRisk epidemiologist	ILRI	Vietnam
Froukje Kruijssen	Scientist (Markets & Trade)	WorldFish	Malaysia
George Laswai	Animal Science Researcher	Sokoine University of Agriculture	Tanzania
Germana Laswai	Professor, Department of Animal Science and Production	Sokoine University of Agriculture	Tanzania
Getinet Assefa	Livestock Research Director EIAR	Ethiopian Institute of Agricultural Research (EIAR)	Ethiopia
Girma Abebe	Small ruminant specialist	Livestock Marketing Development (LMD) Program, USAID Dev project	Ethiopia
Girma Tesfahun Kassie	Market economist, quantitative VCA and market interventions	ICARDA-Ethiopia	Ethiopia
Golam Faruque	Program manager	WorldFish	Bangladesh
Golam Hussain	Consultant	WorldFish	Bangladesh
Gourango Boiragi	Member	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Harinder Makkar	Animal production and health Division	FAO	
Hendrik Jan Keus	Chief of Party, AIN project	WorldFish	Bangladesh
Henk van der Mheen	Animal Sciences group	Wageningen University	n/a
Henning Steinfeld	Chief, Livestock Policy	FAO	n/a
Henry Kiara	Scientist	ILRI	Kenya

Henry Njakoi	Country Director	Heifer International	Tanzania
Hikuepi (Epi) Katjiuongua	Agriculutral Economist	ILRI	Kenya
Hooi Ling Khaw	Research Scientist	WorldFish	Malaysia
Hoong Yip Yee	Research Scientist	WorldFish	Malaysia
Hugues de Verdal	Visiting Scientist (CIRAD)	WorldFish	Malaysia
Hung Ngyuen-Viet	Country representative	ILRI	Vietnam
Ian Wright	Deputy Director General – Integrated Sciences	ILRI	Kenya
Iddo Dror	Head of Capacity Development	ILRI	Kenya
Idupulapati Rao	Plant Nutritionist and Physiologist	CIAT	Colombia
Immaculate Omondi	MLE Scientist	ILRI	Kenya
Irene Hoffmann	Chief, Animal Genetic Resources	FAO	n/a
Isabelle Baltenweck	Agricultural economist, Interim Program Leader, Livelihoods, Gender, Impact and Innovation	ILRI	Kenya
Jacobo Arango	Postdoctoral Fellow	CIAT	Colombia
Jamie Craig	Director of Finance and Operations	WorldFish	Malaysia
Jane Wamatu	SR nutritionist, feeding systems assessment, fattening inteventions, improved feed resources	ICARDA-Ethiopia	Ethiopia
Jens Peter Tang Dalsgaard	Program Leader (Livestock & Fish)	WorldFish	Malaysia
Jharendu Pant	Senior Scientist (Aquaculture)	WorldFish	Malaysia
Jhon Freddy Gutierrez	Researcher	CIAT	Colombia
Jimmy Smith	Director General	ILRI	Kenya
Joao Anselmo	Programme Manager of the ANEP-project	EU Delegation Dhaka	n/a
Joe Tohme	Agrobiodiversity Research Area Director	CIAT	Colombia
Johan Soelkner	professor and Head of Animal Science group	BOKU, Vienna	n/a
Johannes Lenstra	professor, editor in chief of Animal Genetics, the official journal of the International Society of Animal Genetics	Veterinary University of Utrecht,	n/a

John Benzie	WF program leader and L&F Genetics program leader	WorldFish	Malaysia
John Miles	Plant Breeder	CIAT	Colombia
Jonas Mugabe and Clesensio Tizikara	Evaluators	FARA	Ethiopia
Jonathan Nunez	n/a	CIAT	Colombia
Joram Mwacharo	SR geneticist; responsible for genetic diversity and adaptive traits	ICARDA-Ethiopia	Ethiopia
Juan Andres Cardoso	Tropical Forages and Climate Change Specialist	CIAT	Colombia
Julie Ojango	Scientist	ILRI	n/a
Julius Bwire	Director	TALIRI-Tanga	Tanzania
Julius Osaso	Research technologist	ILRI	Kenya
Karen Marshall	Focal Point Genetics	ILRI	Kenya
Karolina Kwasek	Intern (Aquaculture)	WorldFish	Malaysia
Kawsar Parvez	Executive Director	Rupsa Allied Industries Ltd.	Bangladesh
Kevin Thomas Kamp	AAS Bangladesh Hub manager	WorldFish	Bangladesh
Kumar Sarker	District Fisheries Officer		Bangladesh
Lady Johanna Mazabel	n/a	CIAT	Colombia
Le Thi Thanh Huyen	Researcher	NIAS	Vietnam
Le Thi Thuy	Researcher	NIAS	Vietnam
Lemma Gizaw	Livestock Specilaist	FAO Ethiopia office	Ethiopia
Lindiwe Sibanda	Chair of the Board of Trustees of ILRI	FANRPAN	n/a
Lorne Babiuk	Chair of Programme Committee, ILRI BoT	n/a	n/a
Lucilla Steinna	Cellular Immunologist and Senior Scientist	ILRI	Kenya
Lucy Lapar	VC coordinator	ILRI	Vietnam
Luu Bi Binh	Vice Director	Nghe An DARD	Vietnam
Mahmudul Karim	Executive Director	Bangladesh Shrimp and Fish Foundation	Bangladesh
Maire Matthews	Head of Development Cooperation	Irish Aid	Tanzania
Malcolm Dickson	Country Program Manager for Egypt	WorldFish	
Mamun Ur Rashid	Technical Manager	WorldFish	Bangladesh

Manh Cuong	n/a	RUDEC	Vietnam
Manjurul Karim	Scientist	WorldFish	Bangladesh
Maqsudur Rahman	President	Bangladesh Aquaculture Alliance	Bangladesh
Margaret Worthington	Forage Breeder	CIAT	Colombia
Maria Eugenia Baltodano	CIAT representative for Nicaragua and Honduras	CIAT	Nicaragua
Marlon Lopez	Project Coordinator	CIAT	Nicaragua
Martin Webber	SPAC member	Independent Consultant	n/a
Masud Akhter	Technical specialist	WorldFish	Bangladesh
Masud Rana Khan	n/a	Nova Tilapia hatchery	Bangladesh
Mats Lannerstadt	Focal Point SASI	ILRI	Kenya
Maureen Miruka	Team Leader Pathways Program,	CARE	n/a
Mauricio Sotelo	Researcher	CIAT	Colombia
Max Rothschild	SPAC member	CF Curtiss	n/a
Mengistu Ragasse	Teamleader SR VC	Mekelle Agricultural Research Center (under Tigray Agricultural Research Institute)	Ethiopia
MG Hussain	Consultant	WorldFish	Bangladesh
Michael Bluemmel	Nutritionist, F&F FP leader	ILRI-Ethiopia	Ethiopia
Michael Bruford	professor at Cardiff University, head of Organisms and Environment Division	Cardiff University	n/a
Michael Peters	Tropical Forages Program Team Leader	CIAT	Colombia
Michael Phillips	Director, Aquaculture and Genetic and PPMC member	WorldFish	several
Michal Harari	Programme Officer	SDC	n/a
Michel Bernhardt	Research Advisor	GIZ	n/a
Mijanur Rahman	President	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Milton Castillo	Country Director	Heifer International	Nicaragua
Miranda Morgan	Post-Doctoral Fellow (Gender)	WorldFish	Malaysia
Mirtunjoy Ghosh	n/a	Depo owner	Bangladesh

Misja Brandenburg	Director, Corporate Services	ILRI	Kenya
Mogus Haile	President	Live Animal Traders Association	Ethiopia
Mohan Chadag, Vishnumurthy	Senior Scientist (Animal Health)	WorldFish	Malaysia
Mohd Fariduddin Othman	n/a	Ministry of Agricultural	Malaysia
Moshiur Rahman	Member	Carp hatchery Association Jessore	Bangladesh
Mostafizur Rahman	Technical specialist	WorldFish	Bangladesh
Mr. Hoa	n/a	Nghe An DARD, Livestock Dept and LIFSAP.	Vietnam
Ms. Jillian	n/a	Helen Keller International	Bangladesh
Mustafizur Rahman	Professor	Khulna University	Bangladesh
Nasima Mijan Mukta	Member	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Nasrin Sultana	Gender consultant	WorldFish	Bangladesh
Nazmul Ahsan	Professor	Khulna University	Bangladesh
Nguyen Do Anh Tuan	DG	IPSARD	Vietnam
Nguyen Duc Trong	n/a	MARD, DLP	Vietnam
Nguyen Ngoc Que	Vice DG	CAP	Vietnam
Nguyen Thi Duong Nga	Researcher	VNUA	Vietnam
Nguyen Thi Thanh An	Country manager	ACIAR	Vietnam
Nguyen Van Kien	n/a	Ea Kar extension division	Vietnam
Nhuong Tran	Scientist (Policy, Economics and Social Science)	WorldFish	Malaysia
Niaz Ahmed Apu	Value chain consultant	WorldFish	Bangladesh
Nicholas Svitek	Scientist	ILRI	Kenya
Nisefori Mkwama	Market Linkage Officer	Faida Market Link	Tanzania
Okeyo Mwai	Principal Scientist, Animal Breeding and Genetics	ILRI	Kenya and Tanzania
Partho Debnath	Lab manager	WorldFish	Bangladesh
Patricia Rainey	Program Support Coordinator	L&F	Kenya
Patrick Dugan	Deputy Director General	WorldFish	Malaysia

Paul Boettcher	Animal Production Officer – Animal Genetic Resources	FAO	n/a
Paul-Theodor Schuetz	Senior Adviser on Agriculture	GIZ	n/a
Pham Duc Phuc	Researcher	HSPH	Vietnam
Pham Hong Ngan (or Nhiem)	Researcher	VNUA	Vietnam
Pham Van Hung	Post doc researcher, economist	VNUA	Vietnam
Phil Toye	Flagship leader – Animal health and PPMC member	ILRI	Kenya
Quazi AZM Kudrat E Kabir	Manager	WorldFish	Bangladesh
Rafiqul Islam Babu	Member	Carp hatchery Association Jessore	Bangladesh
Ramesh Perera	Senior Scientist (Aquaculture)	WorldFish	Malaysia
Ramprosad Kundu	Aquaculture Value chain office	WorldFish	Bangladesh
Rein van der Hoek	Forage researcher and VC coordinator	CIAT	Nicaragua
Rhiannon Pyburn	Consultant, interim Gender leader	KIT	n/a
Roldan Corrales	Technical co-ordinator animal genetics	UNA	Nicaragua
S. Humayun Kabir	Director	Bangladesh Frozen Food Exporters Association	Bangladesh
S.M. Habib	Director	Jubo Academy (NGO)	Bangladesh
Saifuzzaman Moju	Advisor	Carp hatchery Association Jessore	Bangladesh
Sajib Biswas	Field supervisor	WorldFish	Bangladesh
Sam Thevasgayam	Deputy Director Livestock	BMGF	n/a
Sarah Park	Discipline Director (Natural Resources Management)	WorldFish	Malaysia
Shabuddin Hossain	Secretary	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Shadi Azadegan	Communication Specialist	CIAT	Nicaragua
Shahidul Islam	Technical specialist	WorldFish	Bangladesh
Shamima Akhter	n/a	WorldFish	Bangladesh

Sharon Suri	Project Coordinator (Natural Resources Management)	WorldFish	Malaysia
Shelina Afroza	Secretary	Ministry of Fisheries and Livestock (MOFL), Government of Bangladesh	Bangladesh
Shenkute Gosheme	Team leader SR VC, Breeding and Genetics	Debre Birhan Research Center	Ethiopia
Shiferaw Tafesse	Capacity Development Associate	ILRI-Ethiopia	Ethiopia
Shirley Tarawali	Assistant DG	ILRI	Kenya
Shofiullah Khan Milon	Executive Director	Lockpur Group	Bangladesh
Sikandar Lulu	Convener	Carp hatchery Association Jessore	Bangladesh
Silvia Alonso	Post-doctoral scientist	ILRI	Tanzania
Simon Favel	postdoc Environmental Scientist	ILRI	Tanzania
Sizya Lugeye	Chief Advisor, Rural Livelihood and Growth	Irish Aid	Tanzania
Solomon Demeke	Professor	Jimma University	Ethiopia
Stefan Burkart	Socio-economist	CIAT	Colombia
Stephen Hall	Director General	WorldFish	Malaysia
Steve Kemp	Program Leader, Animal Biosciences	ILRI	Kenya
Steve Staal	ILRI regional co-ordinator	ILRI	Vietnam
Stuart Worsley	Head of Development Partnerships	L&F	Kenya
Sujit Kumar Saha	n/a	Bagherhat Sea Foods Ltd	Bangladesh
Sven Genschick	Post-doctoral Fellow	WorldFish	Malaysia
Syed Arif Azad	Director General	Department of Fisheries (DoF), Government of Bangladesh.	Bangladesh
Tassilo Tiemann	CIAT focal point for L&F in Vietnam, based in Laos	CIAT, focal point for L&F in Vietnam, based in LAOS	Vietnam
Taye Tolemariam	Vice president, Academic Affairs	Jimma University	Ethiopia
Tezera Getahun	Director General	Pastoralist Forum Ethiopia	Ethiopia
Tim Paul	Graduate Student Researcher	ILRI	Tanzania
Tom Cadogan	Programme Manager	Irish Aid	Tanzania
Tom Derksen	Managing Director Agriculture	SNV	n/a
Tom Ole Sikar	Co-ordinator Agrihub Tanzania	SNV	Tanzania

Tom Randolph	CRP Director	L&F	Kenya
Tom Sillaya	General Manager	Faida Market Link	Tanzania
Ton That Son Phong	Director	LIFSAP Project	Vietnam
Truong Tan Khanh	n/a	Thai Nguyen University	Vietnam
Vamsi Reddy	Coordinator Small Scale Dairy V/C	ILRI	Kenya
Vi Luu Binh	Vice Director and LIFSAP project co-ordinator	Department of Agriculture and Rural Development (DARD)	Vietnam
Victor Riitho	Post Doctoral Fellow	ILRI	Kenya
Vish Nene	Director, Vaccine Biosciences	ILRI	Kenya
Wagdy Mekkawy	Scientist (Genetics)	WorldFish	Malaysia
Wole Kinati	Research technician Gender	ICARDA-Ethiopia	Ethiopia
Workneh Ayalew	ATA Livestock Director	Ethiopian Agricultural Transformation Agency	Ethiopia
Yaneshet Tesfay	Regional Livestock Expert, Tigray	Livestock and irrigation value chains for Ethiopian smallholders (LIVES), Mekelle, Ethiopia	Ethiopia
Yeong Yeong Oh	Discipline Associate (Aquaculture & Genetics)	WorldFish	Malaysia
Zahidur Rahman Guldar	Secretary	Carp hatchery Association Jessore	Bangladesh
Zakir Hossain	Member	Avoinagar fish hatchery association (Tilapia Hatchery Association)	Bangladesh
Zelalem Abate	Breeding and Genetics	Bonga Agricultural Research Center (belongs to SARI)	
Zelalem Gutu	ICARDA Consultant, Economist	private	Ethiopia

ANNEX E: Quality of science assessment methodology

Overview

The methods of assessment for Quality of Science included the following activities:

- Listening to face to face scientific presentations (during visits to Centers and Value Chain Research Hubs)
- Discussion of presentations with scientists (during visits to Centers and Value Chain Research Hubs)
- Discussion of L & F Programme work with scientific collaborators, policy makers, delivery partners and beneficiaries (during visits to Centers and Value Chain Research Hubs) and additional interviews by telephone or Skype
- Interviews with managers of science, finance, quality assurance and scientific staff (during visits to Centers and Value Chain Research Hubs) and additional interviews as needed
- Review of the of bibliometric assessment provided by IEA
- Reading and scoring a random sample of 25-50 percent of peer reviewed publications including the "top five" best outputs provided by L&F Programme leaders.
- Reading and scoring a random sample of 20 percent of non-peer reviewed publications (see table below for a definition of "publication")
- Assessment of case studies produced by the review team during the assessment

Bibliometric analysis

The analyses below were conducted based on a list of publications provided by L&F. The list included publications produced pre-CRP (2010-2011) and post CRP (2012-mid2015), whereas the numbers of publications in the database were much lower for the pre CRP period.

Citations were sought using Google Scholar for all Journal articles published in the period from 2010 to 2015. Impact factors of journals in which L&F published are based on Journal Citation Reports (JCR) from 2014. The cut-off date for this was 31 August 2015.

H indexes of the leadership team were sought using both Google Scholar and Scopus, whereas the information presented in the main body of the report refers to the Scopus data. The cut-off date for the H indexes is 1 Oct 2015.

Scoring of outputs

A total of 223 (79 peer reviewed and 144 non-peer reviewed) publications were assessed. Documents for scoring were selected from a database of 829 published outputs. This was a subset of the database of 2019 provided by L&F after screening to remove items not considered to be

scientific outputs (brochures, internal reports and some posters, presentations and wiki items that were announcements of intent rather than actual outputs). A few items were also excluded because they were published in a language that the evaluators could not read, or could not be accessed.

The list was stratified by discipline area and then by peer reviewed/non-peer reviewed as defined above. For the purposes of the evaluation, outputs were considered to be peer reviewed if they were published in journals, books or theses where they had clearly been subjected to an external peer review. All others were considered to be non-peer reviewed. The team acknowledges that published reports and briefs are subjected at least to internal peer review, but there was insufficient information in the database provided to assess the level of reviewing that had been applied. Five key outputs in each discipline area, indicated by FP leaders, were included for scoring and the remainder of the sample was selected at random from within each sub-stratum. This means that there may be a slightly favourable bias in the results, since research leaders could be assumed to present work they considered to be their best, but it also ensured that the evaluators did not inadvertently miss reviewing important outputs.

Scoring was done using a 3 x 3 matrix. This is demonstrated in the diagram below. Scoring was undertaken by members of the review team with expertise in the relevant scientific "discipline areas". At least 25% of the peer reviewed outputs were scored for all "discipline areas" and in many areas at least 50% were assessed.

Each publication, whether peer reviewed, or non-peer reviewed (grey press/report/powerpoint presentation), was be scored on two criteria, a) overall Quality and/or Novelty and b) Impact and/or Usefulness. For consistency, the same scoring system was used for peer-reviewed and non peer-reviewed outputs.

a) overall Quality and/or Novelty is scored from C-A with C being acceptable, B being good and A being excellent.

b) overall Impact and/or Usefulness is scored from 1-3 with 1 being acceptable, 2 being good and 3 being excellent

If any publication failed to meet the minimum acceptable scored for either Quality/Novelty or Impact/Usefulness then the publication was recorded as not meeting the standard.

For **peer reviewed publications**, Quality was defined as meeting international or national standards of rigour for study design, methodology, interpretation of results, presentation of hypotheses and conclusions from the research. Impact was broadly defined as the benefit, or potential benefits, from the research described for the discipline or research area.

For **non-peer reviewed publications** (grey press/report/powerpoint presentations) Novelty was described as the originality of the publication in it's aims and objectives and the appropriateness of the study design. Usefulness was assessed by the potential for uptake and use of the output in the context of the target reader or user of the information.

Nine scores were possible for each peer reviewed and non-peer reviewed publication/outputs: 1C, 2C, 3C, 1B, 2B, 3B, 1A, 2A, 3A.

Quality/novelty Acceptable (1)	Good (2)	Excellent (3)	
1A	2A	3A	Excellent (A)
1B	2B	3B	Good (B)
1C	2C	3C	Acceptable (C)

Impact/usefulness

In addition, each publication whether peer reviewed or non-peer reviewed, was scored (yes/no) for the following criteria which are considered important to L & F:

- Inclusion of gender issues
- Relevance to poverty alleviation
- Relevance to food security
- Evidence of multi- or inter-disciplinary research

ANNEX F: Value chain case studies

LIST OF ABBREVIATIONS

A4NH	Agriculture for Nutrition and Health CRP
ADDAC	Asociación para la Diversificación y el Desarrollo Agrícola Comunal (Association for Diversification and Community Agricultural Development)
AAS	CRP on Aquatic Agricultural Systems
ACIAR	Australian Center for International Agriculture Research
AH	Animal Health (Flagship)
AI	artificial insemination
AIN	Aquaculture for Income and Nutrition
ASOGAPCON	Asociación de Ganaderos y Productores de Condega (Association of Ranchers and Producers of Condega)
ATA	Agricultural Transformation Agency
BMGF	Bill and Melinda Gates Foundation
CAHW	community-based animal health workers
CAP	Centre for Agricultural Policy
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza (Center for Tropical Agricultural Research and Higher Education)
CBBP	community-based breeding programme
CCAFS	Climate Change, Agriculture and Food Security (CGIAR Research Program)
CEI	Centro de Exportaciones e Inversiones (Center for Export and Investment Nicaragua)
CIAT	International Center for Tropical Agriculture
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement (French Agricultural Research Centre for International Development)
CRP	CGIAR Research Program
CRS	Catholic Relief Services
DARD	(Provincial) Department of Agriculture and Rural Development (Viet Nam)
DDF	Dairy Development Forum
DOF	Department of Fish
DREMS	data recording and management system
EADD	East Africa Dairy Development
ECF	East Coast fever

EIAR	Ethiopian Institute of Agricultural Research
Faida MaLi	Faida Market Link
F&F	Feed and Forage (flagship)
FAO	Food and Agriculture Organization of the United Nations
FFS	farmer field schools
GAHP	good animal husbandry practice
GEF	Global Environment Facility
GIZ (or GTZ)	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Corporation for International Cooperation)
ICARDA	International Center for Agricultural Research in the Dry Areas
IEA	Independent Evaluation Arrangement
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Cooperation on Agriculture
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
INTA	Instituto Nicaragüense de Tecnología Agropecuaria (Nicaragua Agricultural Technology Institute)
IP	innovation platform
IPSARD	Institute of Policy and Strategy for Agriculture and Rural Development
ITM	infection and treatment method
L&F	CRP on Livestock and Fish
LIFSAP	Livestock Competitiveness and Food Safety Project
LIVES	Livestock and Irrigation Value Chains for Ethiopian Smallholders
MARD	Ministry of Agriculture and Rural Development (Viet Nam)
MilkIT	Milk in Tanzania and India
MLE	monitoring, learning and evaluation
MLFD	Ministry of Livestock and Fisheries Development
MoARD	Ministry of Agriculture and Rural Development
MoreMilkiT	More Milk in Tanzania
NARS	National Agricultural Research System
NBO	Nairobi
NIAS	National Institute of Animal Sciences (Viet Nam)
NWO-WOTRO	The Netherlands Organisation for Scientific Research (NWO) Science for Global Development
PI	principal investigator

PIM	CRP on Policies, Institutions and Markets
POWB	Program of Work and Budget (of the CGIAR)
RUDEC	Rural Development Centre (Cameroon)
SASI	Systems Analysis for Sustainable Innovation (Flagship)
SNV	Stichting Nederlandse Vrijwilligers (Foundation of Netherlands Volunteers)
SPIA	Standing Panel on Impact Assessment (a sub-group of the CGIAR Independent Science and Partnership Council)
SUA	Sokoine University of Agriculture
TALIRI	Tanzania Livestock Research Institute
TDB	Tanzania Dairy Board
TOC	theory of change
TOSCI	Tanzania Official Seed Certification Institute
TNU	Thai Nguyen University
TZ	Tanzania
UNA	Universidad Nacional Agraria (National Agricultural University)
USAID	United States Agency for International Development
VCTS	Value Chain Transformation and Scaling (flagship)
VNUA	Viet Nam National University of Agriculture
WF	WorldFish

F 1: Bangladesh research hub

Written by John Morton. Based on the visit report by John Morton and Rex A. Dunham. 3 December 2015

1. Overview of the programme

Development context

Bangladesh is the world's fifth largest aquaculture producer.[1] Fish is the most important food after rice, by expenditure, and represents 60 percent of the animal protein consumed. It is also the most frequently consumed nutrient-rich food. Within the fisheries sector, there has been a marked shift towards aquaculture. Between 2000 and 2010 the annual per capita consumption of species predominantly associated with inland culture rose from around 3.4 kg to around 7.6 kg and those species' share within fish consumption rose from 24 percent to 42 percent.[2] There was increased fish consumption by extremely poor, moderately poor and rural people during this period, indicating that aquaculture growth is and can in future be pro-poor.

Sixty percent of Bangladeshi households currently experience moderate or severe food insecurity, and the inland capture fisheries sector is in rapid decline.

The economic returns from aquaculture are attractive compared to alternatives such as rice cultivation. More than 4 million households practice "quasi-peasant" production of farmed fish, combined with other livelihood strategies; the bulk of production is accounted for by more commercialized smallholders.

Aquaculture is a national policy priority, the Department of Fisheries is supportive and effective, and there is long-term commitment to aquaculture by various donors, as manifested in projects with a value chain focus.

L&F approach and programme portfolio

The CGIAR in L&F Bangladesh is represented by WF.

The L&F programme in Bangladesh has been shaped by two main factors: Bangladesh was identified as one of the nine value chains for L&F research after L&F started, as a result of WF's reappraisal of the prospects for research on the Uganda aquaculture value chain (approval from the L&F Program Planning and Management Committee was only given in April 2014 – although WF has formally reported on the Bangladesh value chain activities since 2013); WF has managed and implemented

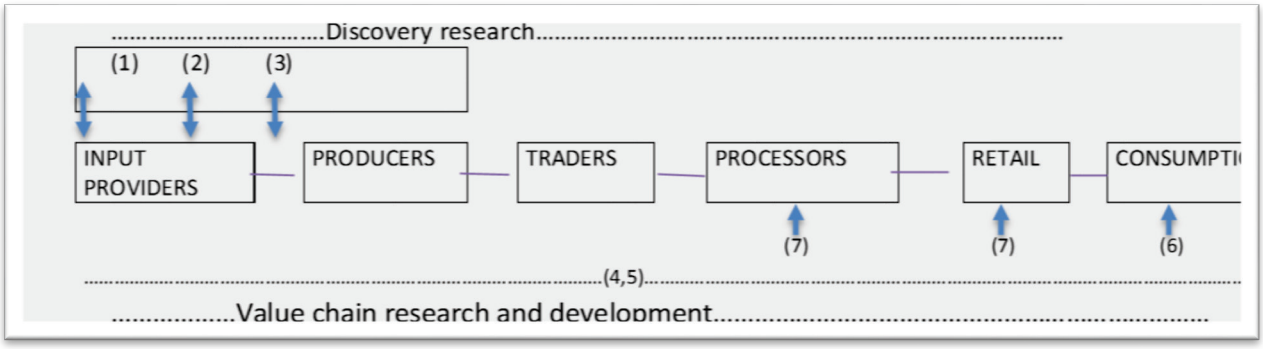
[1] The next two paragraphs draw heavily on presentations made to the evaluation team by Jens Peter Tang Dalsgaard and Ben Belton, and on Toufique and Belton 2014.

[2] Toufique and Belton 2014. By including species associated with both culture and capture the 2010 figures increase to 11.8 kg and 65 percent.

the USD 16 million USAID-funded AIN project since 2011 – 25 percent of this project is "mapped onto" L&F (75 percent is mapped onto AAS) and it funds the great mass of L&F activities in Bangladesh. Additional funding comes from the Market Development for Quality Fish Feed Project, part of the SDC/Danida/DFID-funded Katalyst programme.[3]

The L&F programme has focused on Southwest Bangladesh (Jessore, Khulna and Barisal Divisions) for its value chain work, because of relative poverty, existing concentration of aquaculture in Khulna, Jessore, Satkhira and Bagerhat Districts, scope for expansion in Barisal Division, and existing activities of AAS and AIN. In terms of species, there is a focus on *silver carp*, *tilapia* and *rohu* as the 2nd, 3rd and 4th most consumed fish species in Bangladesh,[4] plus *mola*, a small indigenous fish, consumed in relatively small quantities but rich in micronutrients, and a species of importance to women and to the poor. Research on shrimp and prawn continues to be included in L&F, an apparent inconsistency with high-level statements, but rational in the context of the role of shrimp and prawn in the polyculture of small producers (as well as the employment generation for women in the shrimp export value chain).

L&F research in Bangladesh is currently focused on the input provision stages of the value chain



Work under the discovery flagships focuses on the supply of genetic material in general, including disease free material, and fish feed. It thus works largely at the level of input suppliers and their linkages to farmers.

- Animal Genetics (1); WF is working with the private sector and government to establish sustainable systems for improving and distributing improved carp and *tilapia* lines to hatcheries;
- Animal Health (2); work is ongoing on assessment of emerging disease issues in *tilapia*, on delivering White Spot Syndrome Virus-negative postlarvae through private hatcheries and promoting more bio-secure management practices;

[3] Because of the heavy preponderance of USAID funding through AIN for the programme, detailed data on other sources of funding was not systematically collected.

[4] The most consumed is *Pangasius*, but this is generally farmed by larger producers in Northwest Bangladesh.

- Feed and Forages (3); work on upgrading commercial feed quality and feed mill performance through capacity-building, promotion of feed formulation software and more efficient machinery, and work to increase access to low-cost feeds among smaller producers by supporting semi-automatic feed mill development.

The programme has commissioned value chain assessments from secondary data and literature (4) with a fully gender-sensitive value chain assessment currently in the data analysis stage, among other gender-focused research (5). In addition, there is significant work taking place on nutrition (6), including consumption patterns disaggregated by poverty status, and intra-household consumption patterns. Some work funded under AIN supports processors (of crustaceans) and retail markets (7). Work on the VCTS flagship outside these headings is still mainly in the planning stage.

The focus on input provision and downstream value chains to consumption complements the focus of AAS on farm-level production.

2. Highlights

Established and working well

- The programme has relevance to the livelihoods and nutrition of the poor.
- It has formed a range of partnerships that are founded on WF's high reputation in Bangladesh.
- The primarily national staff are skilled and committed.
- AIN funding has unquestionable advantages for L&F because of the security and lower transaction costs of having assured long-term funding, and because it promotes an intense level of interaction with value chain actors. The partnership has advantages for AIN management in that it gives scientists a long-term perspective and a "joined-up approach" in which to plan strategically for research. This includes the opportunity to develop new streams of work under all three L&F discovery flagships. USAID, as donor, has approved the research agendas, and benefits from them in terms of continuity of technical backstopping, though WF feels the need to manage the way research is framed in what is mainly a development project, with development deliverables.
- L&F's familiarity with the value chain throughout its long history in Bangladesh, and particularly with AIN, allows research priorities to be communicated back to the L&F technology flagships generically and informally for strategic planning and prioritization – for example, informing the Animal Genetics flagship of the importance of genetic research on *mola*, as a species of importance to women and the poor, paving the way for work in this in the near future.
- The programme is engaged in high-quality research planning and, partially through legacy projects, the publishing of high-quality science. This excellence extends across biophysical and social science. Quality of science has been impacted in a positive way by increased organization and planning and placing more emphasis experimental design. It has produced high-quality peer-reviewed science from legacy research and high-quality drafts are being prepared from recent L&F research.
- The evaluation team were impressed by the plans and completed work in the fields of human nutrition and gender, which should be of interest to other L&F value chains. The literature review and gap analysis of the selected value chains in Southwest Bangladesh (Innovision

2014) is succinct and of high-quality. We were also impressed with some socio-economic research outputs such as the *World Development* article on fish consumption.[5]

- The quality and impact of work in gender deserves particular mention. Research by WF Bangladesh is having a positive impact on gender inequity, with novel training and strategies, such as developing husband-wife family teams, that increase the income of poor families. The gender aspects of the value chain analysis and other gender research activities are now in the statistical analysis stage and there is collaboration on gender with several other CRPs. The aim of spending 10 percent on gender may not be realistic. It may be more realistic to budget a proportion of time. One problem relating to gender is that the technology being offered is male-oriented, and women do not always have sufficient education to accept technology.

Emerging and interesting

- Innovative research on feeds is making an impact. The emerging Fish Health flagship is logically planned and the epidemiology strategy is a good one and fits the value chain approach well. There is a comparative advantage in epidemiology and it should continue to be emphasized. Feed stuffs research needs more emphasis on journal publication, but has strong output in important grey literature. Animal Health needs a more clearly outlined plan to publish in journals.

Constraints/vulnerabilities/gaps

- There is an imbalance between development and research, and the L&F programme needs to progress towards a marked increase in research activities. While there are some differences in emphasis within the WF Bangladesh team we feel there is broad agreement on the need for a shift towards research. This would involve recognizing the status of L&F as a research programme and would add value to bilaterally funded development programmes that WF implements; it would also facilitate career progression for WF national scientific staff. Strategic use of W1/2 funds here (and this cannot be divorced from the overall issue of the balance of W1/2 against bilateral funds in WF's share of L&F) will assist this process.
- The low level of capacity to carry out and write up high-quality research is a concern. The senior national staff who could be engaged in research activity are too thinly spread and thus lose sight of research interests. Large data sets sit unanalysed. There is a lack of dedicated research facilities for WF Bangladesh, opportunities to use the research facilities of the DOF have not been taken up and the hatchery management underlying biophysical research could be more efficient.
- While the CRP approach has helped to increase funding, it has also resulted in high transaction costs that have been eating up too much of the time that should be spent on WF Bangladesh core business.

Additional comments

The short period in which the Bangladesh programme has been recognized as an "official" value chain of L&F, as well as the complexity of its relationship with AIN, should be taken into account in considering its strengths and relative weaknesses.

[5] Toufique and Belton 2014.

3. Findings against evaluation questions

This section expands on and adds to the highlights presented in section 2.

1. Is the maxim "more meat, milk & fish – by & for the poor" credible and realistic

The L&F programme in Bangladesh justifies the combination of contributing to the nutrition and livelihoods of the poor. The rationale for aquaculture development, and therefore aquaculture research, being pro-poor is made carefully and persuasively by Taufique and Belton (2014) and we were impressed by the way in which the importance of *mola* to the nutrition of women and the poor was communicated to the Animal Genetics flagship for work in the near future. In terms of production systems AIN is targeting small farmers with less than 2 hectares of land and our observation of the AIN farmer training on shrimp production (granted that shrimp is not a declared priority for L&F) revealed that some of the participating farmers owned little or no land and were shrimp farming on rented land. AIN support to the shrimp processing can be seen as supporting wage labour in the industry, which is 60 percent female.

2. CRP Flagship coherence: is there a valid, demonstrable and logical contribution of the discovery flagships to the broader value chain-centred delivery flagship, and vice versa?

The Bangladesh value chain is articulating demand for research to the discovery flagships. L&F's familiarity with the value chain throughout its long history in Bangladesh, and particularly with AIN, allows research priorities to be communicated back to the L&F technology flagships generically and informally for strategic planning and prioritization – for example, informing the Animal Genetics flagship of the importance of genetic research on *mola*.

Given the late start of Bangladesh as a formally selected value chain for L&F, it is difficult to say at present whether the discovery flagships have been able to capture this demand.

3. Does L&F have sufficient capacity (in all senses) to deliver on the promise of a value chain approach to enhancing the roles of livestock and fish?

While WF Bangladesh is clearly large and effectively run, much of the capacity is committed to the day-to-day running of AIN and other more development-oriented activities. At the time of the evaluation visit the post of value chain coordinator had been vacant for several months, which is a concern (though the WF Programme Leader was putting in some time as acting coordinator).The low level of capacity to carry out and write up high-quality research is also a concern, but this relates mostly to biophysical research. A relatively small number of staff are able to work on formal research outputs of international quality, though others are involved in the production of significant reports for development donors, which appear as grey literature. The senior national staff who could be engaged in research activity are too thinly spread in multiple projects and with multiple management responsibilities, and thus lose sight of research interests. Large data sets sit unanalysed. There is a lack of dedicated research facilities for WF Bangladesh, opportunities to use the research facilities of the DOF have not been taken up, and the hatchery management underlying biophysical research could be more efficient. There is more capacity in socio-economic and human nutrition research, though the loss of the former value chain coordinator is felt.

4. What has been the added value (if any) of integrating previous livestock and fish research programmes into the CRP?

The programme is clearly dependent on the presence of AIN as a (mainly) development project. Legacy research and development can claim partial credit for the dramatic improvement in aquaculture and progress on gender within the Bangladesh value chain. It is worth noting that a key research output, which has provided a rationale for the country programme, Toufique and Belton (2014), was prepared under GIZ research funding already in place at the inception of L&F work in Bangladesh.

5. Does L&F have the appropriate partners for research on value chains, and is it using the right partnership models and principles?

WF Bangladesh has a wide array of partners including small farmers, private sector organizations, aquaculture associations, universities, NGOs and Bangladesh government agencies. All are enthusiastic about their relationship with WF Bangladesh and respect WF Bangladesh. The L&F programme/WF is clearly held in high esteem by key actors within government. The country director's ability to converse fluently in Bangla strengthens these relationships with the NARS and is likely to have stimulated greater cooperation and collaboration. Additionally, some national staff are well networked and well respected in Bangladesh, increasing WF Bangladesh effectiveness.

Incentives provided by WF Bangladesh (though see Sustainability below) and their reputation and impact has garnered strong farmer collaboration, which has overcome weakness in research capacity and facilities and resulted in the pond access needed to conduct genetics research. WF Bangladesh has established three-way partnerships, with appropriate incentives, among farmers, processors and associations that could set the table for sustainability maintained by market mechanisms and the private sector, as the system will generate more income for the processors and marketers.

WF Bangladesh has integrated graduate students and internships into its work with partners and there is potential to expand this. Khulna University includes a research component in its undergraduate programme as well as its MSc programme, which indicates that there is further scope for partnership.

Some partners do not know if their vision of the future matches that of WF Bangladesh. The partners recognize that national infrastructure is weak, and would like WF Bangladesh recommendations and help on this issue. Some partners complain of a lack of communication with senior management, some are unrealistic and some think communication is good. Both small and large partners worry about the sustainability of the progress made by WF Bangladesh. Some large partners believe that this is the responsibility of the farmer associations and that they should develop their own capacity.

The partners feel that WF should have follow up and assessment for each project, and they do not recognize that this is being done. There are complaints about delayed commencements of projects. Some government partners feel that the key for local communities is to become more science-oriented and that local farmers should link to associations, and this is how to address the sustainability of the research output.

However, another government partner felt that relevant institutions and partnerships cannot totally depend upon the private sector for capacity, compliance and sustainability. DOF and the ministry say they will always be there trying to develop extension activities and quality control. Rules and regulations of WF Bangladesh and other international organization and those of the external resources division of the Ministry of Finance are impediments to the government working more closely with WF Bangladesh and vice versa.

6. How is gender explicitly integrated into the CRP to enhance impact?

We were impressed by the planning and completed work on gender. Despite some of the technology offered being male-oriented, and underlying problems of low levels of education among women and tensions between women's childcare responsibilities and enhanced participation in aquaculture, research by WF Bangladesh is already having a positive impact on gender inequity with novel training and strategies, such as developing husband-wife family teams, that increase the income of poor families.

The gender aspects of the value chain analysis and other gender research activities are now in the statistical analysis stage and there is collaboration on gender with several other CRPs. The aim of spending 10 percent on gender may not be realistic. It may be more realistic to budget a proportion of time.

7. To what extent has L&F leveraged capacity across the CGIAR centres?

The ability to harness expertise from WF headquarters, and the involvement of headquarters senior staff, is impressive. There is very little use of capacity from CGIAR centres other than WF. This might be regarded as a missed opportunity in relation to socio-economic research. IFPRI value chain work in Bangladesh (funded under other CRPs) emphasizes the quantitative analysis of aquaculture. WF have chosen a more qualitative approach, in part to avoid duplication, but has had a long wait for access to the IFPRI output. We do not feel the relative lack of collaboration with other L&F participants on value chain analyses has been a constraint. There are few obvious ways in which non-WF expertise might contribute to the more technical aspects of the Bangladesh work.

8. How does L&F contribute to global poverty reduction through livestock and fish research?

The pro-poor orientation of the L&F programme in Bangladesh includes the focus on *mola*, a small indigenous fish, consumed in relatively small quantities but rich in micronutrients, and a species of importance to women and to the poor. Research on shrimp and prawn continues to be included in L&F, an apparent inconsistency with high-level statements, but rational in the context of the role of shrimp and prawn in the polyculture of small producers (as well as the employment generation for women in the shrimp export value chain).

The linkages between L&F and AIN are clearly going to be important to the impact that research on aquaculture value chains can have on poverty reduction. WF has provided proof of concept for the genetic improvement of farmed fish and its upscaling throughout the country. Data has been collected that demonstrates the impact of genetic improvement and a strong research reputation has been established in genetics. The extent to which the message on genetic improvement has already been spread was, however, the subject of a surprising difference of opinion among our informants.

At present we feel there could be more emphasis on global public good research (not only technical, but also on modalities of outscaling) to extend the impact on aquaculture beyond Bangladesh.

9. How well has L&F delivered to date against planned outputs?

Because of the late stage at which Bangladesh was identified officially as a value chain within L&F, it is difficult to answer this question.

10. To what extent do governance and management arrangements in L&F help it to reach its SLOs and IDOs?

As a single-centre value chain, governance and management arrangements are comparatively simple, and we saw little evidence that they were constraining progress. There were concerns from WF staff about the high transaction costs – attendance at meetings etc. – of operating within a CRP framework. There was some concern from government partners about delays due to WF budgetary procedures, but much less than there was about the government's own procedures. There was concern from L&F staff about changes in budgets being announced at very short notice.

Relevance

The overall orientation of the Bangladesh programme is highly relevant to both the nutrition and the livelihoods of the poor. By and large, the areas chosen for research by WF Bangladesh are highly relevant. Many areas of emphasis are not cutting edge, but are of a very practical nature and this has led to high impact. There may be a need for slightly more balance. Many of the species that are researched in the value chain are of relatively high value. The value chain benefits the poor by providing employment or income, but does not always provide food for personal consumption. Research opportunities into how to directly feed the poor, particularly with small fish with high fecundity, may be lost, and the strategy may need to be more balanced to examine both feeding the poor through income generation and growing low-cost fish for home consumption. These strategies are further complicated by feedbacks between adoption of technology, production, price and farmer choices between fish species: some farmers may switch away from species preferred by the poor if production increases drive prices down too far.

Quality of science

The Bangladesh programme has produced high-quality peer reviewed science from legacy research and high-quality drafts are being prepared from the recent L&F research.

Genetics is a major programme, it has further activities planned and it has had tremendous impact in Bangladesh. Care must be taken not to spread the programme too thinly as this could affect the quality of the work. The *rohu* breeding programme is on the verge of a significant mistake: the national staff appears to understand the necessity and importance of maintaining and using genetic controls, but the prevailing attitude throughout the organization is one of excitement and emphasis on the genetically improved fish line and there is not a lot of thought about the genetic control. In general, prioritization of traits is good, however, there may not be enough input from the value chain – simple questioning revealed that consumer and farmer inputs may not yet be adequately considered in the planning of the genetics programme. Dissemination plans are needed for genetic outputs from the new selection programmes.

Feed stuffs research related to animal responses needs more emphasis on journal publication. Agronomy of feed stuffs but has produced strong output both in journals as well as in important grey literature. Animal Health needs to outline more clearly its plan for publishing in journals.

As regards socio-economic research, the literature review and gap analysis of the selected value chains in Southwest Bangladesh (Innovision 2014) is succinct and of high quality. We were impressed

with some socio-economic research outputs such as the *World Development* article on fish consumption,[6] as well as work presented to us on human nutrition.

The CRP approach may be impacting quality of science in a positive way by increased organization and planning and placing more emphasis on experimental design, but not many among the staff and partners can produce international quality publications, although there is a much broader capacity to contribute to development impact. The limited capacity of the WF Bangladesh scientists to design good science is being addressed by having writing and design workshops. Again, writing output is hindered by management responsibilities and inadequate staffing.

Effectiveness and efficiency

We have no strong conclusions under these headings. The CRP approach has helped to increase funding. However, it has also resulted in high transaction costs, including not enough time for research and writing, multiple meetings and workshops, multiple reporting requirements in multiple directions, changes in formats, and changes in nomenclature; all of which has been eating up too much of the time that should be spent on WF Bangladesh core business.

Impact

It is difficult to distinguish between the impact of L&F Bangladesh and the impact of AIN, which is a massively funded development programme. At present, our conclusion is that impact specifically attributable to L&F activities is in its early phases. There was a strong feeling that this is a good approach to doing CGIAR research. L&F promotes communication between flagships and affects prioritization. Long-term planning in Animal Genetics and other flagships has been positively influenced, assuming that the CRPs survive. The CRP approach has helped WF Bangladesh move away from the project-by-project approach to doing research and promoted vision. We accept that the impact of AIN has been considerable.

Sustainability

In some regards, the farmer partners have become quite dependent on WF Bangladesh technical support. They express fear regarding sustainability upon the completion of the WF Bangladesh projects. We were struck by the relatively heavy element of subsidy (to private sector actors and wealthier farmers) in some of the AIN activities (while recognizing that we are not evaluating AIN, and that there may in any case be good reasons for this). Another way of looking at this question would be to say there are opportunities for a research agenda that looks specifically at the arguments for and against different forms of subsidy, and targeting subsidy in upscaling would be an important contribution to L&F, in accordance with remarks already made in the CRP-commissioned evaluation of value chains.

[6] Taufique and Belton 2014.

4. Additional material

Table 1: Outputs from the programme

Paper	Karim, M., Sarwer, R.H., Brooks, A.C., Gregory, R., Murshed-e-Jahan, K and Belton, B. (2012) The incidence of suspected white spot syndrome virus in semi-intensive and extensive shrimp farms in Bangladesh: implications for management. *Aquaculture Research*, 43(9): 1357–1371
Paper	Debnath, P., Khan, S.H., Karim, M. Belton, B., Mohan, C.V. and Phillips, M. (2015). Review of the history, status and prospects of the black tiger shrimp (*Penaeus monodon*) hatchery sector in Bangladesh. *Reviews in Aquaculture* 1–13
Paper	Debnath, P., Karim, M. and Ben Belton (2014). Comparative study of the reproductive performance and White Spot Syndrome Virus (WSSV) status of black tiger shrimp (Penaeus monodon) collected from the Bay of Bengal. *Aquaculture* 424–425: 71–77.
Working Paper	Mamun-Ur-Rashid, M., Belton, B., Phillips, M., Rosentrater, K.A. (2013). Improving aquaculture feed in Bangladesh: From feed ingredients to farmer profit to safe consumption. WorldFish, Penang, Malaysia. *Working Paper: 2013-34*.
Paper	Mamun-ur-Rashid, Belton, B., Phillips, M. and Karim, M. (2013) The current status of aquaculture and aquafeed production in Bangladesh. *World Aquaculture*, December 2013
*Paper	Toufique, K.A. and Belton, B. (2014). Is aquaculture pro-poor? Empirical evidence of impacts on fish consumption in Bangladesh. *World Development* 64: 609–620
*Paper	Ben Belton and Simon Bush (2014). Beyond net deficits: new priorities for an aquacultural geography. *The Geographical Journal,* 180(1): 3–14
Report	Belton B, Ahmed N, Murshed-e-Jahan K (2014). Aquaculture, employment, poverty, food security and well-being in Bangladesh: A comparative study. Penang, Malaysia: CGIAR Research Program on Aquatic Agricultural Systems. *Program Report: AAS-2014-39*
*Report	Innovision Consulting Private Limited (2015) *Literature review of selected aquaculture value chains in southern Bangladesh*. CGIAR Program on Livestock and Fish
*Report	Apu, N.A, (2014) Bangladesh small and medium-scale aquaculture value chain development: Past trends, current status and likely future directions. CGIAR Program on Livestock and Fish
*Report	Innovision Consulting Private Limited (2012) Value Chain Analysis: shrimp, prawn and tilapia from the Southern Region of Bangladesh and Feasibility Analysis: Brackish Water Sea-Bass in the Southern Region in Bangladesh
*Programme Document	Bangladesh Fish Value Chain (updated business case). Issue brief from 9th Program Planning and Management Committee Meeting, Penang, 3-4 April 2014. CGIAR Program on Livestock and Fish

* These documents were reviewed for the case study.

F2: Ethiopia research hub

Written by John Morton. Based on the visit report by John Morton and Paolo Ajmone Marsan. 30 November 2015

1. Overview of the programme

Development context

Ethiopia has Africa's largest total livestock herd, the world's ninth largest, including 54 million cattle, 25.5 million sheep and 24.1 million goats (CSA 2013 cited in Legese and Fadiga 2014).[7] Sheep and goats are found in all the regions of Ethiopia, across a broad range of ecosystems, and the population of both species is steadily increasing. Relatively speaking, sheep are associated with highland areas and goats with lowland areas. Ninety percent of sheep and almost 100 percent of goats are from indigenous breeds, many from well-known named breeds associated with particular localities.

The L&F programme focuses on sheep and goats, and takes place through nine geographically specific value chains, spread across five of Ethiopia's regions.

The main purpose of keeping sheep and goats is for sale, mainly of surplus males, for cash. Marketing chains are extremely varied and complex. Some of the specific value chains involve end markets in the Arab Gulf States – this includes a very significant direct trade across the borders with Somaliland, Somalia and to some extent Kenya, which is illegal in the eyes of the government and for which accurate figures are very difficult to obtain.

The development of the small ruminant value chain in Ethiopia is dependent on consumption of small ruminant meat by the Ethiopian middle classes and residents in the Gulf States (this is not to ignore the importance of sheep and goat milk for child nutrition in some sites, but small ruminants contribute more to livelihoods via animal sales). The strapline "more meat, milk and fish, by and for the poor" appears to have generated a certain amount of confusion across L&F, and we would like to put on record that we believe the Ethiopia programme's focus is entirely consistent with the vision of L&F as a whole, and our own vision of development for poor livestock-keepers.

L&F approach and programme portfolio

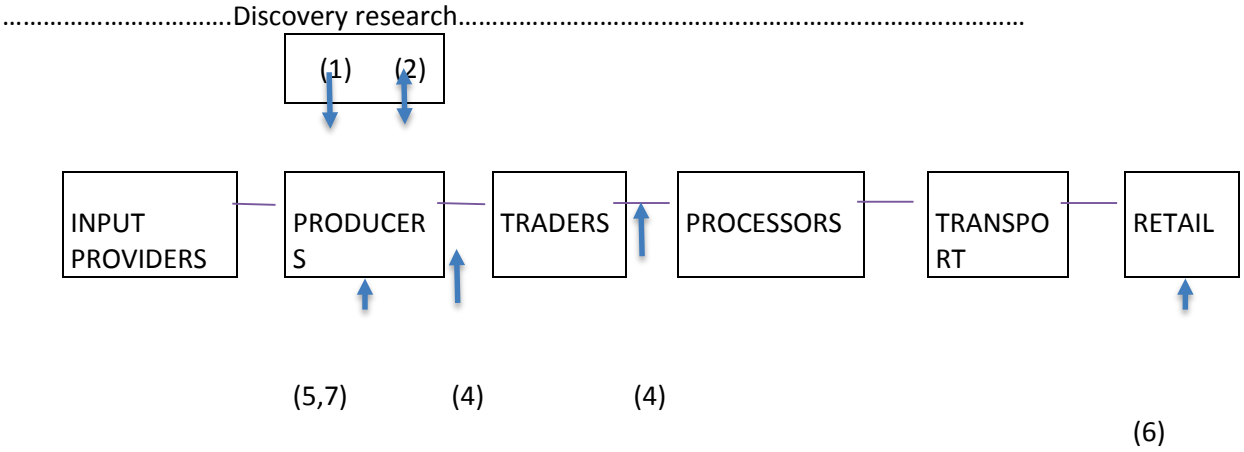
L&F research on small ruminants in Ethiopia is a joint activity of ICARDA and ILRI. Its status is thus structurally different from the WF-led value chains and the CIAT-led value chain in Nicaragua.

The programme aims to improve the equitability, sustainability and efficiency of sheep and goat value chains through four main impact pathways:

[7] CSA (Central Statistical Agency). 2013. Agricultural sample survey, 2012/2013 (2005 EC). Report on livestock and livestock characteristics. Statistical Bulletin 570. Addis Ababa,Ethiopia: CSA. As cited in: Legese, G., Fadiga, M. 2014. Small ruminant value chain development in Ethiopia: Situation analysis and trends. ICARDA/ILRI Project Report. http://hdl.handle.net/10568/52339

- innovative approaches to increase the capacity of small ruminant value chain actors;
- innovative models for developing small ruminant value chain markets and institutions;
- efficient and sustainable strategies for improving small ruminant animal health;
- efficient and sustainable strategies for boosting small ruminant production and supply.

The work of L&F is quite strongly concentrated at the producer end of the value chain



The distinction between "discovery" and "value chain development" work is not always clear in Ethiopia. The most important "discovery" research thrust has been in Animal Breeding and Genetics, using Community-Based Breeding Programmes (CBBPs) as entry points (1). This work has been carried out with limited support from the FP scientists in ILRI and WorldFish.

In addition there has been survey work under the Feed and Forage FP, using FEAST (Feed Assessment Tool) to characterize livestock systems and TechFit (a tool to prioritize feed technology interventions) (2).

Value chain research activities have included:

- value chain mapping and analysis, including gender-focused re-analysis (3);
- economic research on decisions to market and pricing in rural markets (4);
- Research on gender and livestock ownership (5);
- Research on Food Safety under A4NH (6)

At the time of the visit, research on animal health had barely started, but was expected to grow, focusing on her health, thus at producer level (7)

The programme has used CBBPs as an entry point. These were implemented by ICARDA from 2010 onwards in Bonga,[8] Menz and Horro, under bilateral Austrian funding. These have proved successful and popular and the model is now being implemented in Atsbi, both Abergelle sites and Doyogena under L&F and planned in the other value chains. CBBPs serve as an entry point for interacting with communities, and other value chain actors, on researchable constraints in feed supply, animal health and marketing, and facilitate data collection, particularly in genetics.

Three of the four programmes have adopted a system whereby the farmer keeps a selected ram/buck for breeding purposes and is eventually reimbursed for his management by half of the difference between the original purchase price by the cooperative and the eventual on-sale price to other communities/consumers. This appears to be an innovation that arose spontaneously in Bonga, and should itself be regarded as an important contribution to the practice of CBPP worldwide.

Key partners include:

- the various regional agricultural research institutes;
- EIAR, which retains a loose coordinating role between the various agricultural research institutes;
- IFAD as a donor;
- FAO;
- ATA (which is a government agency);
- SNV (at both L&F and country level).

Other development actors that the programme collaborates closely with include the government's Livestock Marketing Department, the Livestock Traders Association, and programmes and initiatives within the CGIAR system such as LIVES, Africa Rising and Safe Food, Fair Food.

ICARDA is allocated USD 690 000 a year from L&F W1/2 funds. ILRI make additional allocations from flagship budgets, of either their own staff time or operational costs. Some of these staffing inputs are made on a regular and programmable basis by ILRI (on breeding, communication, gender and now animal health) but other ILRI inputs are made in a less predictable way and in a way less transparent to the value chain coordinator.

The Ethiopia programme benefits comparatively little from W3 or bilateral funding. As stated above, Austrian funding for CBBP allowed the establishment of the sheep-breeding programme before L&F started, and a significant grant has now been negotiated from IFAD, USD 1.2 million over three years to be shared equally between ICARDA, ILRI and the national research partners, extremely closely and flexibly aligned with the core objectives of the programme.[9] The programme also benefits from local-level joint working in the Atsbi value chain with the Canadian-funded LIVES programme.

[8] Bonga is the most successful of the CBBP programmes started under Austrian funding, but is not currently a value chain under L&F. This may be revisited especially as Bonga seems likely to be made a "commercialization cluster" under the government's Growth and Transformation Plan

[9] Because of bilateral funding is effectively from a sole donor, this value chain case study does not contain a table with details of funding.

2. Highlights

Established and working well

- The overall conception of the Ethiopian value chain work, including using existing CBBPs as entry-points, is sound and appropriate. Thematically, we were particularly impressed by the CBBPs, the accompanying genetics research, and the social scientific research (including work on gender and food safety). The Ethiopia country programme is focused on improving the position of poor producers within value chains where the end-consumers are the Ethiopian middle classes and/or residents of the Gulf States. The programme has a high potential for identifying pathways for alleviating poverty and promoting market engagement among small ruminant producers, and for providing global public research goods on small ruminants.
- ICARDA's experience, under various core and bilateral funding, with research on small ruminants in semi-arid environments, especially in community-based breeding, has added value to the L&F programme.
- The programme fits within government policies, and is supported by government policy-makers such as the livestock coordinator within ATA, and the livestock director within EIAR. The programme is operating well in a complex landscape with many development actors, as witnessed by useful discussions on the planned BMGF-funded small ruminant project.
- The array of field sites is appropriate for promoting research in a variety of agro-ecological and market conditions, and is feasible in management terms.
- CBBPs are working well. We were impressed with the management of the CBBPs, and with the involvement of farmers and their understanding of the programmes. Credit for this should be given to the ICARDA staff working within L&F, and the way in which they have encouraged ownership of the programme among national researchers.
- Genetics research is well designed and implemented. The programme of genetic research is closely integrated with the CBBPs. The CBBP sites will be excellent sources of samples and data.

Emerging and Interesting

- Research on value chains, marketing, gender and food safety is very promising. The individual value chain assessments are useful and credible documents, containing a wealth of useful information.Research and training activities under the GIZ-funded project Safe Food, Fair Food, mapped onto A4NH, have been coordinated very closely with L&F activities, and present a promising foundation for future work.
- Research on feed and forages has made significant progress and we are impressed with the overall design of the flagship.

Constraints/vulnerabilities/gaps

- Interaction between the country programme and the Animal Health and Animal Genetics discovery flagships has been problematic, with progress on animal health to date being slow and genetics work being carried out in country with This work has been carried out with limited support from the FP scientists in ILRI and WorldFish.Interaction with the F&F flagship has been much better.

- Progress on environmental issues has been limited.
- Experience with partnerships and capacity-building has been positive but limited. The programme has built up significant partnerships with NARS, government agencies, other CGIAR programmes and to some extent with other donors. Partnerships with NGOs have been rather less well developed.
- Management of the programme has been effective, but the programme suffers from a number of resource and institutional constraints which have slowed progress.

3. Findings against evaluation questions

1. Is the maxim "more meat, milk & fish – by & for the poor" credible and realistic?

The Ethiopia country programme is focused on improving the position of poor producers within value chains where the end-consumers are the Ethiopian middle classes and/or residents of the Gulf States. The experience of the country programme very strongly argues for an interpretation of the programme objective that sees improved nutrition and improved livelihoods as alternative objectives which cannot automatically be assumed to coincide.

Small ruminant producers are a key segment of livestock producers in developing countries, and one with very high levels of poverty and environmental vulnerability. The programme has a high potential for identifying pathways for alleviating poverty and promoting market engagement among small ruminant producers, and for providing global public research goods on small ruminants.

The strapline "more meat, milk and fish, by and for the poor" appears to have generated a certain amount of confusion across L&F, and we would like to put on record that we believe the Ethiopia programme's focus is entirely consistent with the vision of L&F as a whole, and our own vision of development for poor livestock-keepers.

The country programme seems on course, through its work to date, its internal discussions on TOC, and its partnerships strategy, to make its contribution to upscaling and outscaling.

2. CRP Flagship coherence: is there a valid, demonstrable and logical contribution of the discovery flagships to the broader value chain-centred delivery flagship, and vice versa?

For Animal Genetics, it is clear that the field-level experience with CBBPs in the country programme is allowing the identification, planning and implementation of more upstream research. However, as discussed above, the genetics research has largely been done within Ethiopia by Ethiopia-based staff, assisted by European universities. There has been limited support from the flagship leader or genetics researchers in ILRI Nairobi, so in organizational terms this is not a case where the "delivery flagship" is influencing the work of the "discovery flagship".

Research on feeds and forage has made significant progress and we are impressed with the overall design of the flagship. We hope progress can be maintained, and that the programme will be able to investigate storage of crop residues and the use of niche or novel feeds. Loss of nutritional value and/or spoilage of cereal residues by rain under current storage was raised as an issue by farmers in both Tigray sites. We note the use of farmer knowledge and preferences that is made in research on

feed, and hope this will be carried into participatory demonstrations and where appropriate participatory trials of fodder management.

Feeds and forage research has involved significant interactions with the discovery flagship. This seems to be more because the F&F flagship was well designed, than an indication that research priorities are being transferred from the value chain work.

Progress in animal health research has so far been slow; assuming momentum can be gained, priorities will lie as much in institutional research on delivery as in upstream research.

3. Does L&F have sufficient capacity (in all senses) to deliver on the promise of a value chain approach to enhancing the roles of livestock and fish?

The programme benefits from excellent researchers, including at relatively junior levels, but has suffered from low levels of bilateral funding, and thus of funding overall. The senior staff have had limited time to devote to fundraising and have had little support from the programme management. Additionally, the hub has benefited less than it could from availability of resources within the discovery flagships for relevant upstream research. Nevertheless, we feel the programme has already shown the potential for the value chain approach as an integrating mechanism for strategic, adaptive and socio-economic research within L&F.

4. What has been the added value (if any) of integrating previous livestock and fish research programmes into the CRP?

The programme has usefully capitalized on existing ICARDA activity: CBBPs, its informed support for the improvement of existing breeds over crossbreeding with exotics and its key insight that farmers were operating a form of negative selection in selling the best male animals at an early age. The programme has used these quite properly as a point of entry to work in existing and new field sites.

5. Does L&F have the appropriate partners for research on value chains, and is it using the right partnership models and principles?

The programme has built up significant partnerships with NARS, government agencies, other CGIAR programmes and to some extent with other donors. Partnerships with NGOs have been rather less well developed. For work towards the pastoral/semi-arid end of the environmental spectrum, the country programme will need to establish deeper links with different sets of partners, especially international NGOs .

In Tigray the national researchers (at institute and centre levels) were concerned that the financial aspects of the partnership had not been communicated clearly; this could be investigated and if appropriate remedied through clearer communication. Scientists are benefiting from inter-regional exchanges, for example, on sheep AI.

6. How is gender explicitly integrated into the CRP to enhance impact?

It is too early to report fully on gender-related research in Ethiopia, but we find it encouraging that female preferences for breeding traits are being fed into breeding and genetics work. The planned work on gendered participatory epidemiology should facilitate the same process in animal health research.

7. To what extent has L&F leveraged capacity across the CGIAR centres?

The Ethiopia programme is important as it is jointly implemented by two centres, ICARDA and ILRI. As stated under Question 4, incorporating ICARDA's experience on small ruminants has enriched the programme as a whole.

8. How does L&F contribute to global poverty reduction through livestock and fish research?

The Ethiopia programme is working with some extremely poor communities and focusing on species, sheep and goats, associated with the poor. As noted under Question 1, the country programme promises to improve their livelihoods by improving their position in value chains where the end-consumers are the Ethiopian middle classes and/or residents of the Gulf States, which we see as a proper interpretation of the vision of the L&F programme. We find the conception of impact within the programme, and the relation between development and research objectives, to be entirely consistent with the vision of L&F. Impact at site level will form part of the evidence base for longer-term scaling-up by development actors within Ethiopia, while the programme also looks set to provide international public goods through published research.

9. How well has L&F delivered to date against planned outputs?

Progress has been slow (and this is agreed by the value chain coordinator), although there are important mitigating factors for this. We agree with the coordinator's diagnosis that the reasons include: the development of the programme from very little in-country legacy (only bilateral Austrian funding for three CBBP sites); the decision to work in geographically scattered and agro-ecologically diverse sites; the very complex institutional landscape for this sort of research and development in Ethiopia; but fundamentally – the low level of funding, and the dependence of the programme until this point on W1/2 funding. We note the important success of programme management in securing a USD 1.2 million grant from IFAD that exactly aligns with programme objectives, and current discussions at various levels with development donors.

10. To what extent do governance and management arrangements in L&F help it to reach its SLOs and IDOs?

We have found relations between ICARDA and ILRI staff within the programme to be harmonious and well managed. There is an issue however that the value chain coordinator only manages ICARDA funds. Important staffing inputs are made on a regular and programmable basis by ILRI (on breeding, communication, gender and now animal health) but other ILRI inputs are made in a less predictable way and in a way less transparent to the value chain coordinator. High transaction costs of coordination (especially attendance at frequent meetings) were a major issue.

Relevance

The Ethiopia country programme contributes to the overall relevance of the L&F programme to global livestock production issues through its attention to livestock species associated with poorer producers, to semi-arid environments and pastoral systems, and to livestock value chains involving long distance trade. It successfully shows the relevance of the value chain approach itself as an integrating mechanism for research. The signs are that future work will be relevant to more equitable gender and social impacts.

Quality of science

Quality of science (including social science) is high. Activities in the Animal Genetics flagship use state of the art technologies to investigate the animal genome for diversity, inbreeding, breed genetic structure and useful genes to be eventually used to inform breeding decisions. The CBBP sites will be excellent sources of samples and data. Research in these fields will likely yield good papers. Field applications will not be immediate since they need careful planning and specific adaptation to the Ethiopian livestock breeding system.

We are positive about the scientific level of the researchers and their ambitious goals. Some goals will be difficult to reach, but are worthy of investigation and the scientists involved have the skills and scientific connections to treat the data properly. It is likely that these investigations will yield papers but only partially find immediate application in the value chain.

We note that the important achievements in breeding and in genetics research have been made with limited support from the flagship leader or genetics researchers in ILRI Nairobi.

Effectiveness and efficiency

At present, the programme is showing effectiveness in that it is likely to deliver impact. Factors that have made progress to date slow are set out under Question 9. They include both the low level of bilateral funds (where the expectation has been that country programmes are almost entirely responsible for raising these themselves, and that the allocation of W1/2 funds remains fixed), and less than perfect communication from ILRI research management to the Ethiopia value chain leader about ILRI commitments and contributions to the Ethiopia value chain work.. The latter can be considered a problem in terms of administrative efficiency.

The use of TOC within the country programme was not covered in depth during the evaluation visit, but is evolving, following further involvement by ILRI Nairobi staff in early 2015. The ability to accept government demands to include goats as well as sheep in the programme is itself evidence of effectiveness.

Research on value chains, marketing, gender and food safety is very promising. The individual value chain assessments are useful and credible documents, containing a wealth of useful information. The synthesis of the eight reports is also well executed and has obviously been useful in programme planning. One criticism (which is in fact shared by the programme's senior market economist) is that the synthesis takes a subjective and unnecessarily negative view of intermediate value chain actors such as livestock traders, as essentially predatory middlemen, and ignores the high transaction costs (and in some cases risks) incurred by these actors. It will be important as the research progresses to be objective in identifying costs (while also identifying collusion and rent-seeking where they occur). In addition, both the individual value chain reports and the synthesis were criticized by the current gender team for a neglect of gender issues, despite a significant investment of time in training enumerators by an ILRI gender specialist. A re-analysis of the value chain assessment findings form a gender perspective has subsequently been carried out.

We were impressed by the account given of the quantitative value chain assessment, for which data analysis was ongoing during the visit, and by the plans presented for future research on the economics of marketing. Both the research into the separate and combined effects of collective marketing and market information, and the research on provision of market infrastructure, respond to the needs of livestock producers and policy-makers, and are well designed.

Progress on animal health to date has been slow, partly because of lack of funding from the flagship. The appointment of an international animal health researcher, soon to become the Flagship Leader, looks set to re-energize the work, and the plans presented were extremely interesting, with a useful emphasis on herd health and delivery systems. Given the widespread consensus in East Africa of the advantages of the CAHW model at a local level, and the need to link CAHWs into government policies and the private veterinary sector, it will be worth the programme reflecting and discussing with informed observers on why progress has in fact been slow all over East Africa, including Ethiopia, since the mid-2000s. The idea of training CAHWs or similar recruited from among the farmers was spontaneously raised by farmers in Abergelle, and this might be a suitable site given its remoteness and low population densities.

Progress on environmental issues has been limited by lack of funds and qualified staff. Environmental issues in the Ethiopian context should definitely be seen as including rangeland and water issues, against a certain tendency within L&F to conflate the environment with the question of greenhouse gas emissions. With suitable funding, interesting work on environmental impacts could be done in Ethiopia.

Impact

Legacy projects that are (in financial terms) quite small have had a major impact on the shaping of the programme, but equally are having a direct impact on results. In the case of the Bonga CBBP this extends beyond the level of the intensive pilot to a cluster of neighbouring communities. A model of the CBBP as a positive and scalable institutional innovation in its own right as well as an entry point for further technological and institutional interventions appears very promising.

Sustainability

The programme has performed well in building partnerships with, and capacity in, the NARS at federal and regional level. It has also done well in tracking the evolution of government policy through careful contact with agencies such as the ATA.

Partnerships

Research and training activities under the GIZ-funded project Safe Food, Fair Food, mapped onto A4NH, have been coordinated very closely with L&F activities, and present a promising foundation for future work.

Capacity building

Capacity building is defined in many different ways relative to the programme and different actors have very different expectations. Capacity-building has taken place through formal training courses and on-the-job training for NARS partners, and through sponsoring MSc students and facilitating their fieldwork.

Gender

The gender team is knowledgeable, committed to a gender transformative approach, and looks set to contribute to overall programme progress and eventual impact. The L&F gender framework has been a useful guide, but has had to be adapted in practice. Sheep fattening can be a useful entry point for gender work. Female preferences for breeding traits are being fed into breeding and

genetics work, and with the planned work on gendered participatory epidemiology the same should become true for animal health.

Gender-oriented capacity-building of extension workers and enumerators appears to have worked well, but needs to be followed up. The NARS present issues for gender work as they are very male-dominated. As regards the CBBP cooperatives, we were struck by the absence of female committee members in Bonga and in Menz, but noted the presence of strong female committee members in both Tigray sites. However, there are limited staff resources for gender within the team. The 10 percent quota for expenditure on gender within L&F components has proved useful in managing this component.

Organizational performance

See question 10.

4. Additional material

List as provided by the value chain co-ordinator in June 2015. Some outputs relating exclusively to ICARDA research outside Ethiopia have been omitted.

Table 2: Outputs from the Ethiopia programme

Published Papers - FP2: Breeding and Genetics	
*Paper	Gebre, K.T., Fuerst-Waltl, B., Wurzinger, M., Philipsson, J., Duguma, G., Mirkena, T., Haile, A. Sölkner, J., 2012. Estimates of economic values for important traits of two indigenous sheep breeds of Ethiopia. *Small Rumin. Res*., 105 (1): 154-160.
*Paper	Hassen, H., Lababidi, S., Rischkowsky, B., Baum, M., Tibbo, M. 2012. Molecular characterization of Ethiopian indigenous goat populations. *Tropical Animal Health and Production*, 44 (6): 1239-1246.
Paper	Hassen, H., Baum, M., Rischkowsky, B., Tibbo, M. 2012. Phenotypic characterization of Ethiopian indigenous goat populations. African *Journal of Biotechnology*, 11(73): 13838-13846.
Paper	Kefyalew Alemayehu, Aynalem Haile, Solomon Gizaw, Tadelle Dessie and Yoseph Mekasha, 2012. The synergetic effects of inbreeding and temperature variability on biotic potential of Walia Ibex (Capra walie). *International Journal of Biodiversity and Conservation*, 4(6): 260-266.
*Paper	Mirkena, T., Duguma, G., Willam, A., Wurzinger, M., Haile, A., Tibbo, M., Okeyo, A.M., Sölkner, J., 2012. Community-based alternative breeding plans for indigenous sheep breeds in four agro-ecological zones of Ethiopia, *J. Anim. Breed. Genet.* 129 (2012) 244–253.
Paper	Tesfaye Kebede, Haile A., Hailu Dadi, 2012. Smallholder goat breeding and flock management practices in the central rift valley of Ethiopia. *Tropical Animal Health and Production*. 44(5): 999-1006.
Paper	Tesfaye Kebede, Haile A., Hailu Dadi, Tesfaye Alemu, 2012. Genetic and phenotypic parameter estimates for reproduction traits in indigenous Arsi-Bale goats. *Tropical Animal Health and Production*, 44(5): 1007-1015.

Paper	Zelalem G. Terfa, A. Haile, D. Baker and Girma T. Kassie, 2012. Sheep market participation of rural households in Western Ethiopia. *African Journal of Agricultural Research*, 7(10): 1504-1511.
*Paper	Gebre, K.T., Wurzinger, M., Gizaw, S., Haile, A., Rischkowsky, B., Sölkner, J. 2014. Effect of genetic improvement of body weight on herd dynamics and profitability of Ethiopian meat sheep: A dynamic simulation model. *Small Ruminant Res*., 117(1): 15-24.
Paper	Gizaw, S., Getachew, T., Haile, A., Rischkowsky, B., Sölkner, J., Tibbo, M. (2013). Optimization of selection for growth in Menz sheep while minimizing inbreeding depression in fitness traits. Short communication. *Genetics Selection Evolution*, 45: 20. DOI 10.1186/1297-9686-45-20.
Paper	Terfa, Z.G., Haile, A., Baker, D., Kassie, G.T. (2013). Valuation of traits of indigenous sheep using hedonic pricing in Central Ethiopia. *Agricultural and Food Economics*. 1:6
**Paper	Gizaw, S., Goshme, S., Getachew, T., Haile, A., Rischkowsky, B., van Arendonk, J.A., Valle-Zárate, A., Dessie, T., Mwai, A.O. 2014. Feasibility of pedigree recording and genetic selection in village sheep flocks of smallholder farmers. *Trop Anim Health Prod*, 46(5):809-814. doi: 10.1007/s11250-014-0569-6
Paper	Gizaw, S., Rischkowsky, B., Valle-Zárate, A, Haile, A., van Arendonk, J.A.M., Mwai, A. O., Dessie, T. 2014. Breeding programs for smallholder sheep farming systems: I. Evaluation of alternative designs of breeding schemes. *J Anim Breed Genet.* 2014 Jun 18, DOI: 10.1111/jbg.12101
*Paper	Gizaw, S., van Arendonk, J.A., Valle-Zárate, A., Haile, A., Rischkowsky, B., Dessie, T., Mwai. A.O. 2014. Breeding programs for smallholder sheep farming systems: II. Optimization of cooperative village breeding schemes. *J Anim Breed Genet.* 2014 Jun 19. doi: 10.1111/jbg.12102.
Paper	Mekuriaw, S., Haile, A. (2014) Genetic Parameter Estimates for Growth and Reproductive Trait of Sheep for Designing Breeding Program in Ethiopia: A Review. *Open Access Library Journal*, 1: e589. http://dx.doi.org/10.4236/oalib.1100589
Paper	Getachew, T., Gizaw, S. Wurzinger, M., Haile, A., Rischkowsky, B., Okeyo, A.M., Sölkner, J., Mészáros, G. 2015. Survival analysis of genetic and non-genetic factors influencing ewe longevity and lamb survival of Ethiopian sheep breeds, *Livestock Science*, Published online 3 April 2015 http://www.sciencedirect.com/science/article/pii/S1871141315001493 ; doi:10.1016/j.livsci.2015.03.021
**Paper	Mueller, J.P., Rischkowsky, B., Haile, A., Philipsson, J., Mwai, A.O., Besbes, B., Valle Zárate, A., Tibbo, M., Mirkena, T., Duguma, G., Sölkner, J., Wurzinger, M. Community based livestock breeding programs: essentials and examples. *J. of Animal Breeding and Genetics*, Special Issue: Quantitative genetics and genetic improvement - papers in honour of John James, 132 (2): 155–168. DOI: 10.1111/jbg.1213630
Published Papers - FP4: SASI-Gender	
Paper*	Galiè, A., Mulema, A., Mora Benard, M. A., Onzere, N. S., Colverson K. 2015. Exploring gender perceptions of resource ownership and their implications for food security among rural livestock owners in Tanzania, Ethiopia, and Nicaragua. *Journal of Agriculture and Food Security*, 4:2, pp14. DOI 10.1186/s40066-015-0021-9

Submitted papers – FP4: SASI-Gender	
Paper	Mulema, A.A., Farnworth, C. R., Colverson, E.K. Gender-based constraints and opportunities to women's participation in the small ruminant value chain in Ethiopia: A community capitals analysis. *International Journal of Sustainable Agriculture*. February 2015.
Papers under preparation – FP2: Breeding and Genetics	
Paper	Hulunim Gatew, Hassen, H. Kebede K., Haile A., Lôbo R. N. B., Yetayew A., Rischkowsky B.. Characterization of production systems and phenotypic characteristics of indigenous goats in the selected areas of Ethiopia
Paper	Joram Mwacharo. The genetic diversity and structure of small ruminants in Ethiopia: current state of knowledge.
Paper	Mengistie Taye, Melese Yilma, Shimelis Mengistu, Tesfaye Abiso, Zekarias Bassa, Shewangizaw Wolde, Rischkowsky B., Dessie T., Okeyo M. Haile A. Breeding practices and breeding objectives of sheep producers in Doyogena district of Southern Nations Nationalities and Peoples Regional state, Ethiopia
Paper	Mengistie Taye, Melese Yilma, Rischkowsky B., Dessie T., Okeyo M, Haile A Morphological characteristics and linear body measurements of Doyogena sheep in Doyogena district of SNNP, Ethiopia
Paper	Temesgen Jembere, Tadelle Dessie, Barbara Rischkowsky, Kefelegn Kebede, Okeyo Mwai, Aynalem Haile. Average estimates of genetic parameters for growth, milk and reproduction traits in goat: A review.
Paper	Tesfaye Getachew, Barbara Rischkowsky, Solomon Gizaw, Aynalem Haile, Maria Wurzinger, Johann Sölkner. Sheep crossbreeding in the low input system of Ethiopia: A Review.
Papers under preparation – FP3: Feed and Forages	
Paper	Jane Wamatu, Dawit Abate, Ashraf Alkhatib, Seid Ahmed Kemal, Barbara Rischkowsky. Variation in the nutritive quality of field pea (Pisum sativum L.) straw in Ethiopian highland varieties.
Papers under preparation – FP4: SASI-Gender	
*Paper	Asresu Yitayew, Yigezu Yigezu , Tilaye T/Wolde, Halima Hassen, Aynalem Haile. Determinants of the Decision to Participate in the Marketing of Goats by Rural Households in Ethiopia.
*Paper	Asresu Yitayew, Yigezu Yigezu , Tilaye T/Wolde, Halima Hassen, Aynalem Haile. Heteroscedastic implicit prices of goat and rural households marketing strategies for goat in lowlands of Ethiopia
PhD Theses	

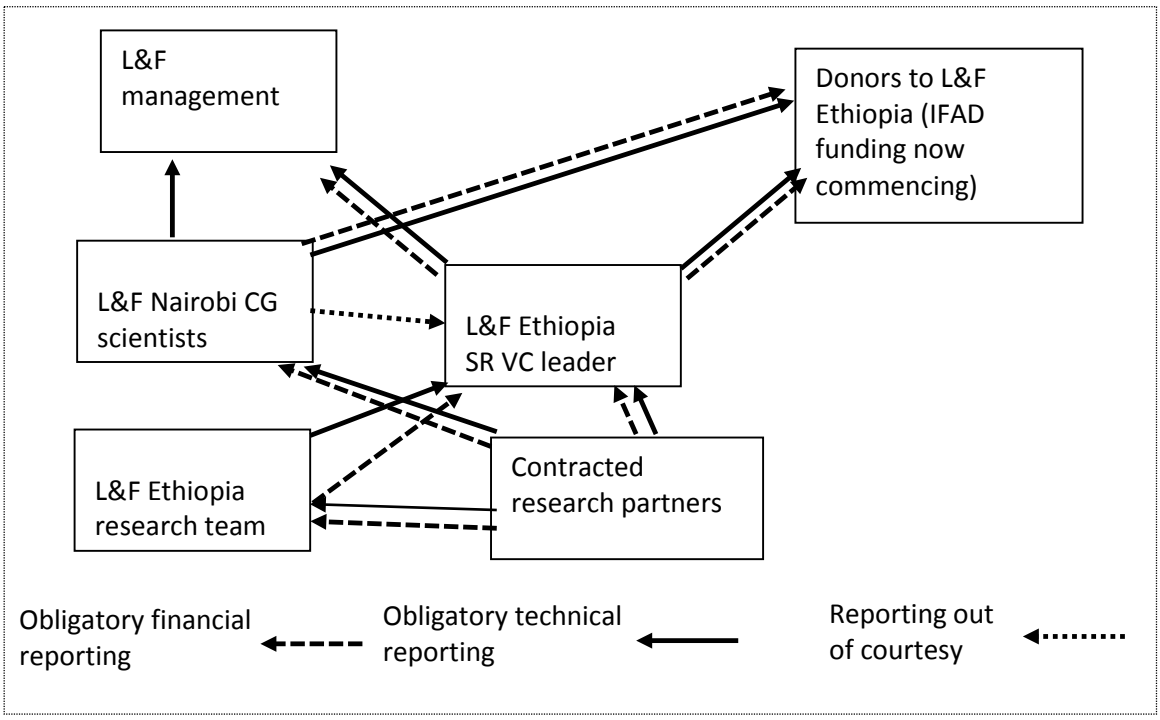
*Thesis	Abegaz, S. 2014. Design of community based breeding programs for two indigenous goat breeds of Ethiopia. PhD thesis. Vienna, Austria: University of Natural Resources and Life Sciences, Vienna.
Conference Papers	
Conference Paper	Mulema, A.A. 2014. Opportunities and constraints to women's access to, and control over, resources in the small ruminant value chain in Ethiopia. Presented at the 23rd International Association for Feminist Economics (IAFFE) Annual Conference, Accra, Ghana, 27-29 June 2014. Nairobi, Kenya: ILRI. https://cgspace.cgiar.org/handle/10568/41876
Conference Paper	Mulema, A.A. 2014. Gender research update in Ethiopia. Presented at the Livestock and Fish Gender team meeting in Ascoli Piceno, Italy, 15-16 September, 2014: ILRI. http://www.slideshare.net/ILRI/gender-update-ethiopia
Conference Papers	Presentations at the 21th Ethiopian Society of Animal production (ESAP) Annual Conference: Livestock and Economic Growth in Ethiopia: Value Chains as a Pathway for Development, August 28 - 30, 2013, EIAR, Hiruy Hall, Addis Ababa, Ethiopia 1. Getachew Legsse. Analysis of small ruminant value chain in Ethiopia. 2. Tadelle Dessie, Girum G. Sheep meat value chains of Ethiopia: Researchable constraints and prospects for "best-bet" interventions. 3. Sultan Usman et al. Value chain analysis of sheep in Sinana District, Bale highlands. 4. Gemeda Duguma et al. Value chain analysis of sheep in Horro district of Oromia Region, Ethiopia. 5. Embaye Kidanu et al. Value chain analysis of sheep in Atsbi district of Tigray Region, Ethiopia. 6. Temesgen Jembere et al. Prioritizing feed technologies using TechFit in Horro district, west Oromia, Ethiopia.
Technical Reports	
Report	Thorpe, W., Wamatu, J., A.J. Duncan. 2012. Small ruminant feeding strategies in smallholder systems: A synthesis of global experiences and recommendations for Ethiopia. Addis Ababa, Ethiopia, ILRI. https://cgspace.cgiar.org/handle/10568/21725
**Report	Duguma, G., Jembere, T., Degefa, K., Temesgen, W., Kumsa, A., Wamatu, J., Duncan, A.J. 2012. Characterization of the farming and livestock production systems and the potential for enhancing livestock productivity through improved feeding in Horro district, Ethiopia. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/25077
Report	Jembere, T., Duguma, G., Degefa, K. and Tolera, A. 2012. Prioritizing feed technologies using TechFit in Horro district, west Oromia, Ethiopia. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/24742
Report	Thorpe, W., Wamatu, J., A.J. Duncan. 2012. Small ruminant feeding strategies in smallholder systems: A synthesis of global experiences and recommendations for Ethiopia. Addis Ababa, Ethiopia, ILRI. https://cgspace.cgiar.org/handle/10568/21725

**Report	Duguma, G., Jembere, T., Degefa, K., Temesgen, W., Kumsa, A., Wamatu, J., Duncan, A.J. 2012. Characterization of the farming and livestock production systems and the potential for enhancing livestock productivity through improved feeding in Horro district, Ethiopia. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/25077
Report	Jembere, T., Duguma, G., Degefa, K. and Tolera, A. 2012. Prioritizing feed technologies using TechFit in Horro district, west Oromia, Ethiopia. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/24742
*Report	Gizaw, S., Abegaz, S., Rischkowsky, B., Haile, A., Mwai, A.O., Dessie, T. 2013. Review of sheep research and development projects in Ethiopia. ILRI Project Report. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/35077
*Reports	• Various authors: 8 value chain site reports • Analysis of goat value chains in Sekota Abergelle district, northern Ethiopia • Analysis of sheep value chains in Horro district, Oromia region, Ethiopia • Analysis of goat value chains in Yabello district, Borana zone, Ethiopia • Analysis of sheep and goat value chains in Shinelle district, Somali Region, Ethiopia • Analysis of sheep value chains in Menz Gera district, North Shewa zone, Ethiopia • Analysis of goat value chains in Tanqua Abergelle district, Tigray, Ethiopia • Analysis of sheep value chains in Doyogena, southern Ethiopia • Analysis of sheep value chains in Atsbi Woreda, Tigray Region, Ethiopia
Reports	Using the Techfit tool to prioritize feed technologies: • in Bekafa, Doyogena District, Southern Ethiopia. http://hdl.handle.net/10568/35606 • in Habess, Atsbi-Wonberta District, Tigray, Ethiopia. http://hdl.handle.net/10568/35604 • in Gebrekidan, Atsbi-Wonberta District, Tigray, Ethiopia. http://hdl.handle.net/10568/35602 • in Golgolnaele, Atsbi-Wonberta District, Tigray, Ethiopia. http://hdl.handle.net/10568/35603 • in Serera, Doyogena District, Southern Ethiopia. http://hdl.handle.net/10568/35605
Reports	Using FEAST to characterize the farming and livestock production systems and the potential to enhance livestock productivity through improved feeding • in Gebrekidan, Atsbi-Wonberta District, Tigray, Ethiopia. http://hdl.handle.net/10568/35608 • in Habess, Atsbi-Wonberta District, Tigray. http://hdl.handle.net/10568/35613 • in Bekafa, Doyogena District, Southern Ethiopia. http://hdl.handle.net/10568/35609 • in Golgolnaele, Atsbi-Wonberta District, Tigray, Ethiopia. http://hdl.handle.net/10568/35607 • in Serera, Doyogena District, Southern Ethiopia. http://hdl.handle.net/10568/35612
*Report	Legese, G., Haile, A., Duncan, A.J., Dessie, T., Gizaw, S., Rischkowsky, B. 2014. Sheep and goat value chains in Ethiopia: A synthesis of opportunities and constraints. ICARDA/ILRI Project Report. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/42181

*Report	Zahra, A., Mulema, A., Colverson, K., Odongo, D., Rischkowsky, B. 2014. A review of Ethiopia small ruminant value chains from a gender perspective. Nairobi: ILRI and Addis Ababa: ICARDA. https://cgspace.cgiar.org/handle/10568/41572
*Report	Legese, G., Fadiga, M. 2014. Small ruminant value chain development in Ethiopia: Situation analysis and trends. ICARDA/ILRI Project Report. http://hdl.handle.net/10568/52339
Report	Colverson, K., Mulema, A., Tesema, E., Ghandi, V., Endashaw, T. 2014. Integrating gender into agricultural programs' workshop, Addis Ababa, 18-20 August 2014. Nairobi, Kenya: ILRI. https://cgspace.cgiar.org/handle/10568/42336
*Report	Kidoido, M.M. 2014. Report from a meeting to develop an impact pathways narrative for the Ethiopia Small Ruminants Value Chain, Addis Ababa, 10-11 February 2014. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/56586
Report	Solomon, A.K., Mwai, O., Grum, G., Haile, A., Rischkowsky, B.A., Solomon, G. and Dessie, T. 2014. Review of goat research and development projects in Ethiopia. ILRI Project Report. Nairobi, Kenya: ILRI. http://hdl.handle.net/10568/42173
Reports in preparation (as of June 2015)	
Report	Tamsin Dewé. Report on the rapid integrated assessment of nutrition and health risks in small ruminant value chains in Ethiopia. ILRI SFFF Report.
Report	Tafera Haile, Annet Mulema. Safe Food Fair Food: Gender perspectives of nutrition and health risks in informal small ruminant value chains in Ethiopia. Nairobi, Kenya: ILRI.
Report	Mourad Rekik, Aynalem Haile, Zeleke Mekuriaw, Ayele Abiebie, Barbara Rischkowsky, Imene Ben Salem. Review of the reproductive performances of sheep breeds in Ethiopia: Documenting existing knowledge and identifying priority research needs. ICARDA Working Paper 23.
Report	Getachew Animut, Jane Wamatu. Prospects for Improving Productivity of Sheep Fattening in Ethiopia Status, Challenges and Opportunities.

* These documents were reviewed for the case study. ** These documents were reviewed for the Quality of Science Review, and contributed to judgements made in the case study

Figure 1: Ethiopia reporting structure



Notes: The Ethiopian value chain does have any contractual relationship with development partners, but exchanges information with a variety of partners.

F3: Tanzania research hub

Written by Anni McLeod. Based on the value chain visit report by Anni McLeod and Peter Udén. 1 October 2015

1. Overview of the programme

Development context

There is high unmet demand for liquid milk in Tanzania. Demand is greatest in urban areas, and a peri-urban dairy system is growing to meet it. However, many livestock keepers live in rural areas, distanced from urban consumers by poor roads and lack of an organized supply chain, and sell to local households and restaurants directly or through small-scale traders.

Milk production occurs in a wide range of agro-ecological zones and farming systems. In the wetter regions and in peri-urban areas dairy value chains are developing to meet urban demand and have received attention from NGOs like SNV and Heifer International. Many dairy farmers keep cross-bred animals. In drier rural areas, production systems are extensive and animals are mostly indigenous dual-purpose breeds, able to withstand seasonal water and feed shortages and somewhat resistant to common diseases. These areas are riskier and more challenging as dairy development locations and have not been targeted for that purpose.

Private companies provide chilling plants and a market for agreed quantities of milk at agreed prices in peri-urban areas. Their coverage is limited in rural villages, many of which have not yet been connected to the electricity grid.

Shortage of forage in the dry season is reported to be a serious problem in many areas. This results in adequate or over-supply of milk in the two wet seasons and under-supply in the dry seasons. One indication of growing shortage is that harvested fields are being rented to pastoralists to graze, where formerly this was free.

TALIRI is adamant that lack of a seed certification policy is a major cause of forage shortage, because without certification there is limited incentive for private companies to sell pasture seed. TALIRI is advocating to TOSCI, the government seed certification body, that it should certify pasture and forage seeds. However, this appears to be an East African issue, which seems to be taking a long time to resolve. Others are less convinced that this is a major bottleneck since pasture seed is available (although not certified) from research centres.

Feed quality is highly variable. A government programme has been set up to assist farmers and service providers in assessing the quality of concentrate feeds, although farmers say that few people have been trained.

Shortage of quality cross-bred and improved indigenous heifers is also reported to be a problem. Although AI is available, Tanzania has no government breeding policy. Policy and implementation guidelines are being developed. There seems to be interest in developing separate breeding programmes for improved dairy animals and the Tanzanian Short Horn Zebu.

Animal health concerns include ECF (vaccination by ITM is available in much of the country but there have been concerns about supply of stabilate), CBPP, foot-and-mouth disease and long reproductive intervals (although it is not clear what causes these and they may be a result of farmer choice).

L&F approach and programme portfolio

The CG in L&F Tanzania is represented by ILRI (Tanzania and Nairobi) and CIAT (Nairobi). ICARDA and WorldFish are not involved.

The objective of the L&F programme in Tanzania is encapsulated by the name it has been given: Maziwa Zaidi (More Milk). Unlike previous programmes that have targeted peri-urban dairy farmers in the wetter areas, it has taken on the challenge of increasing milk supply from semi-intensive and intensive systems in the drier areas.

Maziwa Zaidi has a strong institutional focus, working at local, regional (within Tanzania) and national levels. Locally, it works though dairy "hubs" established in 30 villages. The "hub" concept (see diagram below, taken from an L&F presentation) was taken from ILRI's previous experience as a partner in the EADD programme funded by BMGF. Working through NGO development partners, L&F facilitates dairy farmers to form a group which can then establish secure contractual arrangements with service providers and milk traders or processors. Training is provided in a variety of technical areas upon request from farmer groups. Research can be carried out on technology appropriate to the needs of the hub, and L&F researchers also record and analyse changes in milk supply from the hub and the performance of the hub and value chain. The programme is also doing some strategic research in agricultural economics, notably on economic policy and credit.

Figure 2: Tanzania Hub concept

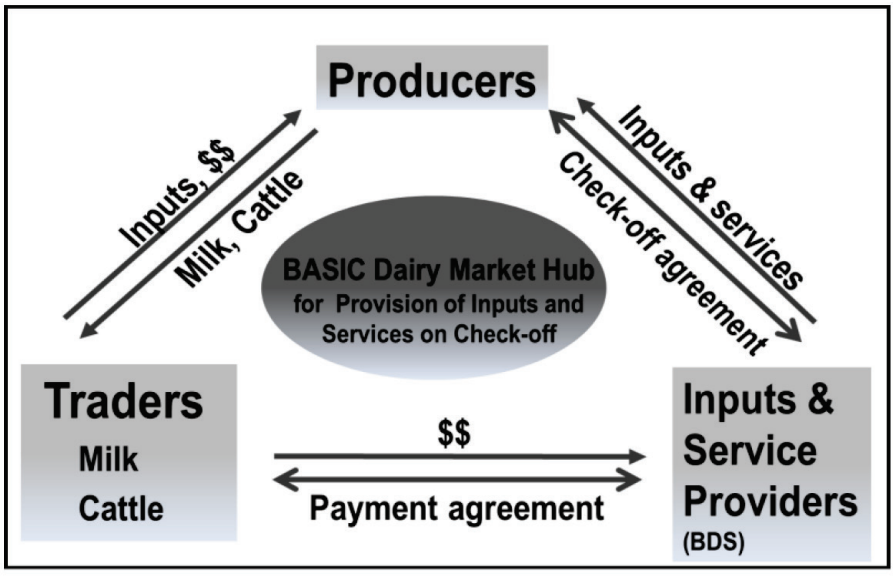
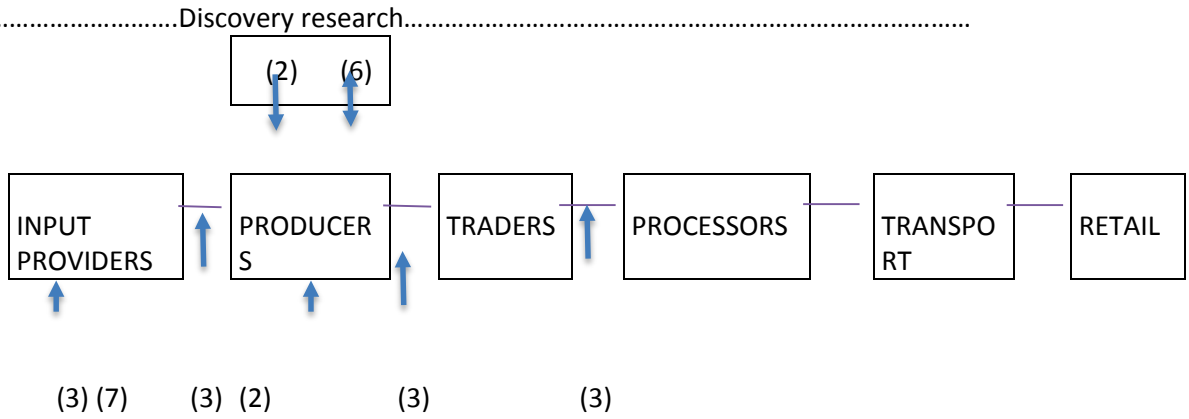


Illustration of a dairy market hub for provision of inputs and services on pay-off arrangements where there no without collective bulking and marketing

Source: PPT presentation by L&F value chain team

Regionally within Tanzania, Maziwa Zaidi has promoted the development of IPs, an idea that has evolved over several years within the development community and is described in an ILRI paper of 2012. An IP is a forum that encourages stakeholders to work together to identify and solve constraints. Nationally, the programme has helped to establish a dairy development forum, with the secretariat held by the TDB, to bring together Tanzanian public sector organizations, the development community and, increasingly, farmer representatives and private sector input providers. Regular meetings are held to identify dairy sector problems and task forces are set up to find solutions. The L&F team has gradually withdrawn from actively facilitating the forum and now participates as a member, to learn from forum discussions where research needs may arise.

The work of Maziwa Zaidi along the value chain is summarized in the diagram below. It works on inputs, production, links between producers and traders, and the policy context. Currently it does not work in the part of the chain between traders and consumers.



Discovery flagships (SASI, F&F, Animal Health) have made contributions in the form of tools and assistance with surveys. In the future Animal Health hopes to provide vaccines and diagnostics and Animal Genetics to provide assistance developing national breeding strategies and AI.

Discovery research activities:

- CBPP penside diagnostics – research being done in Nairobi (1);
- ECF vaccine – research being done in Nairobi (1);
- breeding (upgrading of zebu cattle) – planned research (1);
- tools for feed and forage management, for example FEAST (Feed Assessment Tool) and TechFit (a tool to prioritize feed technology interventions), both from the F&F flagship and for value chain assessment used for research in Tanzania and tested for use in other value chains (6).

Value chain research activities):

- forage/feed supply, animal health (planned), genetics (possibly) (2);

- establishment of dairy hubs based on farmer groups to improve contractual relationships between farmers, traders and processors; provision of training and facilitation to assist farmers in overcoming bottlenecks to increasing milk production and marketing (3);
- value chain mapping and analysis (4);
- facilitation of the DDF start-up and implementation; learning from the DDF about institution and policy issues (5);
- research on factors influencing the use of credit by dairy farmers (7);
- economic research on the structure of market networks and the potential impacts for producers and consumers of improved efficiency in dairy value chains (8).

The majority of operational funding is from bilateral projects. See Section 4 for a breakdown. Two donors (IFAD and Irish Aid) provided bilateral support at the start and others have contributed smaller grants.

The programme has built relationships with local and international research partners and local (or locally based) development partners.

Local research partners are:

- TALIRI. This is a parastatal established in 2012 and mandated to coordinate and conduct livestock research that will provide technologies to improve and sustain the development of the livestock sector in the country. It has seven research centres. It is a research partner (e.g. in the MilkIT project, carrying out research into feeds & forages) and is active in the DDF.
- SUA. Tanzania's oldest (for a long time only) agricultural university. The Agriculture Faculty includes departments of Animal Science and Production, Agricultural Education and Extension, Agricultural Economics and Agribusiness and Food Science and Technology, among others. The university also has a veterinary faculty. It is a research partner, an advisor on the dairy industry (through Prof. Kurwijila, who has been employed as a short-term consultant) and active in the DDF.

Local development partners are:

- Heifer International Tanzania. This is a branch of the Heifer International organization, best known for the "Heifer In Trust" scheme. Heifer mobilizes farmers groups in the dairy hubs and provides training.
- Faida MaLi (http://www.faidamarketlink.or.tz/). A Tanzanian NGO known for facilitating market linkages for smallholder farmers, Faida MaLi provides business orientation and training to farmer groups in the dairy hubs.
- TDB (http://www.tanzaniadairyboard.or.tz/). TDB was established by the Dairy Industry Act Cap. 262 of 2004 and inaugurated on 11 November 2005 with a mandate to develop and regulate the dairy industry. It chairs the DDF.

Other important local stakeholders include:

- MLFD, which is represented on the Maziwa Zaidi advisory board;
- producer and processor associations that participate in the DDF.

International partners include several universities that have assisted with surveys and/or sent postgraduate students on assignment to Tanzania:

- Federal Institute for Risk Assessment (Germany);
- Freie Universitaet Berlin (Germany);
- International Center for Tropical Agriculture (Colombia);
- Royal Veterinary College (UK);
- University of Alberta (Canada);
- Nelson Mandela African Institute for Science and Technology (Tanzania);
- Scotland's Rural College (UK);
- China Agricultural University (People's Republic of China);
- Emory University (United States).

2. Highlights

Established and working well

- L&F is working in a relevant value chain: demand for dairy products is growing in Tanzania and internationally. Dairy products are produced by both rich and (relatively) poor livestock producers and consumed by all but the poorest people. Three impact objectives were identified at an early stage of the programme design and have remained consistent. They are: improved access by dairy farmers to inputs and services; improved access to markets; and access of consumers to dairy products. Identifiable activities are taking place to contribute to the first two objectives and are planned/hoped for the third (mostly on nutrition).
- The programme has made a promising start. It has a compelling title that clearly identifies the ultimate objective and avoids the need to explain the CG to every stakeholder. The key stakeholders interviewed were able to articulate the aims of the programme clearly and in a way that was consistent with the explanations given by the L&F scientists. The core Tanzanian researchers are well qualified and highly committed, and have done good work in creating the necessary institutional environment for delivery. The team leader is very well acquainted with the Tanzanian dairy sector and is respected by key stakeholders.
- There is structural coherence between the value chain programme in Tanzania and the discovery flagships. Discovery flagships are cross-referenced in the 2015 POWB for the value chain. SASI, F&F and to a lesser extent Animal Genetics and Animal Health have provided (or are expected to provide) tools, expertise and human resources to value chain work, and in turn the value chain studies have provided a testing ground for tools such as value chain assessment, feed and forage assessment and environmental impact assessment. It is less evident that programme content is dynamically coherent. The choice of biological research areas and subjects was pre-determined based on previous experience of legacy projects and there is no clear evidence that L&F's value chain findings have shaped the research agenda of the discovery flagships or influenced their strategic direction. Social science appears to have been more adaptable, with the work on gender, for example, being adapted to meet local needs.
- The design of Maziwa Zaidi has drawn on and built on relevant legacy work. The "hub" approach builds on earlier experience and lessons from Kenya and elsewhere through the

BMGF-funded EADD project in which ILRI played a part. The IP approach is also used in PIM, was discussed by ILRI in a publication of 2012 and is based on a concept that had been evolving for some time before that.

- Partnership is a strong and positive feature of this value chain programme. The team has established effective partnership models with research and development partners, particularly SUA, Heifer International and Faida MaLi. The CG is also facilitating collaboration between its development partners through regular planning and tactical meetings of the whole team and the development of a joint training plan. However, dealing with several partners each with a specific agenda adds to the management burden of the team.
- There has been effective leveraging of staff (between this value chain and discovery flagships) and funding (using a range of bilateral grants to support the majority of operational work, while W1/2 pays for the office, core staff and seeds new research activities).
- Gender is well embedded in research activities.

Emerging and interesting

- There is quite a strong social science research component covering agricultural economics, gender and institutional issues. Social science has been part of the programme since the early design phase and continues to make inputs. Grey and (a few) peer-reviewed publications have already been produced or are in the pipeline. The quality of social science appears to be good. It is harder to judge the quality of biological science as much less has been done and this is being driven by discovery flagships.
- The programme has the potential to create impact because it works directly with farmers through the dairy hubs. It is also measuring impacts through annual surveys of milk supply, farmer income and feeding systems. However, in the two and a half years since work began, the focus has been on site selection, baseline surveys and institution building and there have not yet been discernable impacts on the indicators measured.
- There is strong farmer capacity building in the dairy hubs. It is not clear how much researcher capacity building has been done.
- A bilateral programme (Cleaned) has been working on tools for environmental assessment.
- The current TOC is good at capturing complexity and appears to have been developed with partners, but it is not yet an effective strategic or tactical tool for programme management.

Constraints/vulnerabilities/gaps

- The value chain programme in Tanzania was conceived at a time when the CG believed it was designing large and comprehensive research programmes with a 10–15 year time frame and ample core funding, and could therefore afford to take on substantial challenges. The goal of achieving “more milk” from extensive and semi-extensive systems in the dry areas appears highly ambitious in the current funding climate and with the “continuing revolution” in the CRP structure. Maziwa Zaidi is vulnerable to funding shortages, as the majority of funding comes from bilateral projects funded by “development” donors impatient for quick results. It may also be adversely affected by staff cuts at ILRI, as the discovery flagships contribute expertise and staff to research studies in Tanzania.
- ILRI and CIAT staff in Nairobi are insistent that the heavy load of meetings and reporting is impeding progress. The team leader in Tanzania controls the routine administrative workload

by delegating much of it to the PIs, who are the budget holders for the bilateral grants, but is heavily involved in donor and partner liaison and evaluations by the CG system and donors. The evaluation team's observation (although not substantiated by analysis) is that the small Tanzania core team is functioning efficiently but is very stretched – there is little slack in the system.

- The team is small and lacks some necessary skills, particularly in agribusiness/business management.
- The programme's achievements to date have required very hard work; continued success will depend on holding together a complex network of contacts and partners, the continuing support of bilateral donors, and the continuing presence of the present team leader.

Additional comments

CG involvement in a programme with a high "development" content increases overhead and transaction costs compared to a direct investment in "development" NGOs. Do the gains justify the cost and inconvenience?

- The two development partners interviewed in greatest depth (Heifer and Faida MaLi), both stated that they had acquired knowledge as a result of close interaction with researchers and that they appreciated what they had learnt.
- There appears to be a deeper and more thoughtful interaction between the researchers and their development partners when working together on a project than has often been seen when each partner works separately.
- Although IP and hubs are not new ideas, they are being applied in innovative ways.
- L&F is recording and analysing the institutional development occurring through Maziwa Zaidi in a way that NGOs do not normally do. It is also analysing changes in farmer behaviour, use of inputs and milk production in a more rigorous fashion than normal.

BUT

- All of the above have required considerable efforts in developing effective partnership models and researchers who are willing and enabled to be flexible and opportunistic as well as following structured plans.

3. Findings against evaluation questions

This section expands on and adds to the highlights presented in section 2.

1. Is the maxim "more meat, milk & fish – by & for the poor" credible and realistic?

It is too early to tell what L&F's impact on "by and for the poor" will be in Tanzania. However, the Maziwa Zaidi programme has been positioned to try to capture both effects since it is focused on a commodity that is widely consumed by all but the very poorest, including by livestock keepers. It can be argued, with justification, that dairy cattle are not the animals of the poorest of the poor. However, the programme is working in some of the least intensive and most challenging milk-producing systems in Tanzania. Beneficiaries will include livestock keepers whose livelihoods are

highly dependent on livestock, and men and women who are relatively poor in their communities and in the country. Lessons may also be learned from the dairy cow VC which could be applied to dairy goats. The programme also works on dairy goats, although these were not a focus for the evaluation team.

L&F has focused on primarily on producers and their link to inputs and the market and much less on consumers. It is beginning to look at food safety.

Outscaling has been considered from the start in the design (strong links to development partners) and institutional positioning of the programme. There are early indications that outscaling will occur, through development partners taking ideas developed through L&F into new projects.

2. CRP Flagship coherence: Is there a valid, demonstrable and logical contribution of the discovery flagships to the broader value-chain-centred delivery flagship, and vice versa?

There is structural coherence between the value chain programme in Tanzania and the discovery flagships. Discovery flagships are cross-referenced in the 2015 POWB for Tanzania (see Section 4). SASI, F&F and to a lesser extent Animal Genetics and Animal Health have provided (or are expected to provide) tools, expertise and human resource to value chain work, and in turn the value chain studies have provided a testing ground for tools such as value chain assessment, feed and forage assessment and environmental impact assessment. However, it is not clear to what extent the content of discovery flagships is being influenced by value chain findings. The choice of biological research areas and subjects was pre-determined by previous experience of legacy projects and there is no clear evidence that the work done by Maziwa Zaidi is shaping the research agenda of the discovery flagships or influencing their strategic direction.

3. Does L&F have sufficient capacity (in all senses) to deliver on the promise of a value chain approach to enhancing the roles of livestock and fish?

The team in Tanzania is very small for the work it tries to do. It has leveraged capacity through collaboration with discovery flagships and with local research and development partners, and is trying to expand the recruitment of postgraduate students to carry out defined studies. However, all of these partnerships and studentships require supervision, monitoring and sometimes direct engagement by experienced scientists, who are in short supply. The Tanzanian programme has made good use of limited human resources by collaborating with L&F discovery flagships, A4NH and to a lesser extent PIM, but could take greater advantage of emerging research opportunities if the core team was larger and more diverse. It lacks skills and experience in two important disciplinary areas: agribusiness, where there is no identifiable expertise in the CG system, and feed and forage, where expertise has to be supplied by CIAT in Nairobi. It is not clear what role is played by Dr Blümmel, the F&F flagship leader, who is based at the ILRI office in India. The CG system and the Tanzanian research partners also have limited experience in high-quality action-research, which will be needed to take full advantage of the dairy hubs.

Financial capacity is limited and mostly bilateral. Very little is supplied through W1/2, and the core funding available has been used for core staff, office space and as seed money to initiate activities while waiting for bilateral projects to start. The team has been opportunistic and effective in finding bilateral funding from two key projects that initiated the programme (MilkIT and MoreMilkiT) and a patchwork of small and larger grants from a variety of donors.

4. What has been the added value (if any) of integrating previous livestock and fish research programmes into the CRP?

The design of Maziwa Zaidi has drawn on and built on relevant legacy work. The "hub" approach builds on earlier experience and lessons from Kenya and elsewhere through the BMGF-funded EADD project in which ILRI played a part. The IP approach is also used in PIM, was discussed by ILRI in a publication of 2012 and is based on a concept that had been evolving for some time before that.

5. Does L&F have the appropriate partners for research on value chains, and is it using the right partnership models and principles?

Partnership is a strong and positive feature of this value chain programme. The team has established effective partnership models with research and development partners, particularly SUA, Heifer International and Faida MaLi. The CG is also facilitating collaboration between its development partners through regular planning and tactical meetings of the whole team and the development of a joint training plan.

The strongest partnership appears to have been established with two key development partners, Heifer Tanzania and Faida MaLi. Faida MaLi is a Tanzanian organization that is reported to be obtaining funding from several sources to work in various agricultural value chains, mainly providing business solutions. Collaboration with them, therefore, has the added advantage that learning can be outscaled to other value chains in Tanzania. Both partners are contracted by ILRI and it could be argued that the balance of power is weighted on ILRI's side. However, both are strong organizations with many demands on their time and could choose not to work with ILRI. For example, according to Heifer's annual report of 2014, the project on which it works with ILRI is only 4 percent of the total budget allocated to Tanzania (although it is a larger percentage of the budget directly managed in Tanzania, since the largest Heifer projects are managed regionally or follow a strictly established model driven by Heifer International in the USA). Faida MaLi also works with other partners and is directly contracted by donors for some of the work it does. The evaluation team observed at first hand the two-way communication and consultation between ILRI and each of these NGOs. The present approach, to mobilize and train farmers and study what they do, has been negotiated over time, based on learning from experience. Both NGOs stated clearly and without prompting that they appreciate having a closer collaboration with researchers than has previously been the case, and that they have learned useful things from the partnership – so far, these benefits have outweighed the inconvenience of an extra administrative layer and the lengthy time taken to sign memorandums of understanding and mobilize funding.

The local research partners are the best organizations available and the relationship with SUA appears to be effective. The SUA researchers told the evaluation team that they appreciated having close contact with the CG, even though the funding model of L&F constrains the research they can do. There are benefits to the CG in having a well-established local research partner with a wide range of expertise. SUA could potentially add expertise to the programme through the Agribusiness department, if only a link could be established – L&F has tried to make the link through student projects but so far this has been unsuccessful. It is less clear how the relationship with TALIRI is working, or what TALIRI brings to the table other than its positional power within the dairy sector.

L&F also has a looser but effective relationship with the TDB, which has very broad contacts across the sector and is in a position to influence government policy.

6. How is gender explicitly integrated into the CRP to enhance impact?

Gender has been a strong part of Maziwa Zaidi since it was first designed. Expertise has been supplied by SUA (a sociologist, working on contract) and ILRI-NBO, to carry out baseline studies and value chain assessment. Studies have also been carried out on gender issues in dairy goat keeping (the programme covers dairy goats) and it is expected that the research methods used will be transferrable to dairy cattle.

7. To what extent has L&F leveraged capacity across the CGIAR centres?

ILRI-NBO and CIAT-NBO have been involved in the programme through other flagships and as budget holders in studies carried out by the Tanzania programme (see Section 4). No other CG centres appear to have been involved.

9. How well has L&F delivered to date against planned outputs?

Because the Tanzania programme depends so much on bilateral funding, and from such an array of donors, it is a mind-boggling process to map outputs against the L&F plans, and the evaluation team has not succeeded in doing this. Our impression is that the programme is, for the most part, delivering what the bilateral donors expect, although at a delayed pace. Follow-up work will be needed to determine whether it is delivering what was written in the POWB.

10. To what extent do governance and management arrangements in L&F help it to reach its SLOs and IDOs?

The overwhelming impression is that current governance and management arrangements do more to add workload than to help the programme reach its development goals. During 2015, there are/will be evaluation activities by IEA, SPIA and bilateral donors as well as a CRP call. When asked by the evaluation team: “what is your biggest constraint to progress?” the ILRI and CIAT scientists in Nairobi said “too many meetings, too much reporting, too much administration”.

The Tanzania VC leader, like the VC leaders in other countries, must deal with a multi-way network of reporting (see Section 4), but for complete information on what is happening in Tanzania must rely on the goodwill of bilateral project PIs (who hold the budget and are only obliged to report to L&F management and the donor). This could potentially be a structural flaw but has not been a problem to date, as communication between the L&F Tanzania team leader and PIs carrying out work in Tanzania has been good.

The Tanzania team leader appears less burdened with routine management overload than scientists at centres (he has delegated very effectively), receives constructive technical and strategic advice from the L&F team leader, and said that the team had benefited from discussions during the current evaluation visit.

11. Does L&F adequately cover poultry research (given the documented demand, nutritional value and opportunities offered by poultry)?

Poultry appears to be the most widely eaten meat in Tanzania – at almost every meal someone commented on its popularity. The demand for pig meat is also growing, but not as quickly, and it is not as widely consumed. When asked: “if your programme was to expand to include another value chain, which value chain would you choose?”, the first choice of the Tanzania team was poultry. They

then said that the dairy value chains in which they work should really be treated as dual purpose cattle value chains, as they are in semi-extensive and extensive management systems where the asset value of cattle and their meat is as highly prized as the milk they produced (at least by men).

12. Does L&F adequately cover NRM and environmental issues associated with livestock and fish that are not captured within other CRPs?

The Tanzania programme is beginning to consider environmental issues, through a bilateral ACIAR project. The team could not judge whether it is devoting enough attention to them.

13. Does L&F adequately cover post-harvest opportunities for value addition and loss avoidance that are not captured by livestock and fish research in other CRPs?

The Tanzania programme works mostly with producers and their links to input suppliers, milk traders and processors. It does not yet work further up the value chain and has no obvious plans to do so. However, the question of value addition is likely to arise. The community visited by the evaluation team were very clear about the price at which they were willing to sell raw milk, demanding a specific level of profit over the production costs, and said that this was because they can process milk into “siagi” (a form of butter) and store it for the dry season – selling raw milk at a low price represents an opportunity cost for them. There ought to be potential to do more work in value-addition through processing, as cultured milk and butter are consumed in Tanzania and butter is imported.

Relevance

Global demand for dairy products is projected to grow. In Tanzania, liquid milk is widely consumed and there is reported to be a large unmet demand for milk and to a lesser extent other dairy products. Seasonality of supply means that farm-gate prices fluctuate between wet and dry seasons. Previous research by ILRI and others has shown that small-scale dairy production can increase household income, improve household cash flow and generate employment beyond the farm. Dairy development projects, if appropriately designed and managed, can create opportunities and improve the well-being of both women and men. In the Tanzanian context the choice of the dairy value chain seems highly relevant.

L&F has decided to work primarily in sites where dairying is less developed, and more challenging to develop, than the peri-urban, rapidly developing dairy value chains that have been the focus of much development effort. The choice made by L&F is consistent with the CRPS’s mandate to work with the poor, and is in line with Tanzanian government policy objectives. However, it is riskier than working in higher-potential areas as results will take time to materialize and some expected results may not be realized. The choice of sites was made at a time when L&F had good reason to expect a reasonable level of medium- to long-term funding and could confidently take on a programme of work with some risk. The current climate of short-term funding and opportunistic fund-seeking is less conducive to long-term and risky research. L&F will require very clear communication about long term goals, as well as very clearly demonstrated short-term returns, to be able to acquire the funding needed to take the programme to conclusion.

Quality of science

The programme has quite a strong social science research component covering agricultural economics, gender and institutional issues. Social science has been included since the early design

phase. From our preliminary appraisal the quality of work appears to be good. Little has been published in journals but the evaluators were provided with two draft economics papers submitted to journals and also reviewed material from value chain assessments. It is harder to judge the quality of the biological science as much less has been done and this is being driven by discovery flagships.

The programme has only been operational since the end of 2012 and published outputs to date have mostly been grey literature:

- reports on site selection, assessment of constraints on each site, and site-specific training plans;
- descriptions of the establishment of the institutional framework through which to deliver research results;
- internal reports on the use and applicability of tools developed by discovery flagships;
- reports on baseline and follow-up surveys;
- presentations explaining the project's philosophy and reporting progress to donors.

A few peer-reviewed papers have been produced, mostly from legacy workPeer-reviewed journal and conference papers from new L&F research are beginning to emerge, either published or accepted for publication.

There does not seem to be an established mechanism for mentoring or peer-to-peer discussion among scientists of the same discipline. Exchanges of ideas seem to be limited to the times when ILRI or CIAT scientists or those from partner universities visit from Nairobi for fieldwork, and occasional contact with peers based at the IITA compound in Dar es Salaam.

Effectiveness

The programme has made a promising start. The compelling title clearly identifies the ultimate objective and avoids the need to explain the CG to every stakeholder. Maziwa Zaidi is institutionally well embedded in the Tanzanian dairy sector through work in the village based dairy hubs, regional IPs and participation in the national DDF. The key stakeholders interviewed were able to articulate the aims of the programme clearly and in a way that was consistent with the explanations given by the L&F scientists. However the potential of the Maziwa Zaidi "brand" has not been fully explored – no one seems to know exactly what "success" will look like or when "more milk" is likely to materialize. The current TOC is good at capturing complexity and appears to have been developed together with partners, but it is too detailed and complicated to be an effective strategic or tactical tool for management or to explain the programme to outsiders.

Two donors (IFAD and Irish Aid) provided bilateral support at the start and others have contributed smaller bilateral grants.

There has been a systematic approach to defining what is to be done in each hub. This has developed over time, it is not complete and needs further work. However it demonstrates the growing collaboration between research and development partners.

There has been active collaboration between the VC flagship, SASI and F&F, particularly on assessment tools. L&F also collaborates with A4NH and PIM. Through this broad collaboration network there is potential to expand the range of research topics, for example, feed and milk processing to take advantage of expertise within the NARS.

The core Tanzania team members are well qualified and highly committed and have done good work in creating the necessary institutional environment for delivery. The team leader is very well acquainted with Tanzanian dairy sector and is respected by key stakeholders.

There is a strong focus on learning in the MLE model being developed through MoreMilkiT. These are not only "nice words" but a genuine philosophy of Maziwa Zaidi, illustrated by, for example:

- growing dialogue between researchers and development agents about the value of research and the nature of research needed – development partners acknowledge the learning that they are gaining from working closely with researchers (in spite of occasional frustration at slow delivery);
- the CG system is seen as less "distant" than formerly, as a result of working closely with development partners and local researchers through jointly delivered projects
- the project team is reflecting on appropriate research models when working at the research–development interface.

It is not yet clear how the learning will influence future directions of either research or development within Maziwa Zaidi.

However, the achievements to date have required very hard work; continued success will depend on holding together a network of contacts and partners, the support of bilateral donors and the presence of the current team leader. Funding has been put together like a patchwork quilt, with new grants coming on stream as old ones run out, but not necessarily providing continuity in the subject areas covered.

The team is small and lacks some necessary skills, particularly in agribusiness/business management, where there is no core expertise in ILRI or CIAT. The CG team in Tanzania has no feed and forage research experience and appears to be obtaining this expertise from ILRI and CIAT in Nairobi on an irregular basis. There is no evidence of proactive efforts by senior scientists in ILRI or CIAT to shape the feed and forage research done in Tanzania by SUA or others.

For the most part, the programme appears to be delivering on planned outputs, although more slowly than originally expected, and the need to report to bilateral donors means that the team has to be output-conscious. However, it is hard to map planned outputs of bilateral projects to the Tanzania value chain POWB, and impossible to map against the consolidated POWB for the VC flagship, which groups several countries each deliverable.

Efficiency

Research efficiency

The team in Tanzania has been effective in leveraging research capacity through collaboration with discovery flagships, with research and development partners and with other CRPs. However, it is a very small team and there is a limit to the number of partnerships and collaborations it can manage while still producing quality results. It also walks a fine line between doing research and using highly qualified scientists purely as research managers. As previously mentioned, scientists from ILRI-NBO and CIAT-NBO spend time in Tanzania, but they are involved in other flagships and other value chains. The 11 people listed in the POWB of F&F assigned to ILRI are funded at a level of 73 total full-

time equivalent months and it is not clear how much time they devote to the flagships or each value chain.

The team has also been effective in leveraging resources through bilateral grants. By focusing on hubs and to a lesser extent the facilitation of IPs and the DDF, it is finding a way to channel and focus diverse resources on diverse topics. The wide array of donors means that it has been able to be flexible and focus on L&F-defined goals – no one donor drives the agenda. However, it also means that the team spends a lot of time looking for funding.

Administrative efficiency

The lines of communication (technical and administrative) between L&F in Tanzania and the discovery flagships are confusing to the outsider although they appear to be clear to the team (also see the diagram of management structure in Section 4). The Tanzania scientists work with a small number of ILRI-NBO and CIAT-NBO scientists and report directly to the L&F management on technical and financial issues. Some projects carried out in Tanzania are managed by scientists from ILRI and CIAT offices elsewhere, who are not obliged to report to the L&F team leader in Tanzania. If interpersonal communication was poor, this could create chaos for programme management and accountability; however, communication appears to be good, and so the current structure lightens the administrative load for the Tanzania team leader.

Impact

The programme has the potential to create impact because it works directly with farmers through the dairy hubs. It is also measuring impacts on milk supply and farmer income through annual surveys. However, in the two and a half years since work begin, focus has been on site selection, baseline surveys and institution building and there have been no measurable impacts on milk production or incomes.

There is potential for farmers to have direct involvement in or influence on CG and NARS research (rather than simply acting as “lab rats”) through the largely unexplored opportunity to do genuine action research within the dairy hubs (i.e. learning together with farmers, rather than learning about them), in addition to the more conventional model of recording what is happening as the hubs develop and analysing the results after three years. The evaluation team has identified two examples: an attempt to introduce new pasture species into the “ololili” forage management system practised by Masaai communities; and an attempt to test cut and carry with Napier grass in intensive systems. Neither was successful. The ololili experiment indicates that a change in local bye-laws are required to prevent forage “poaching”.

However, the CG does not appear to have strong capacity to carry out genuine action research – it is better at observing and recording what farmers do than carrying out research together with them. Neither does this expertise appear to exist within the national research system. If the Tanzania programme is to realize its full potential, it may need to partner with organizations experienced in action research in order to develop this capacity.

Sustainability

The Tanzania programme has been operational for less than three years and it is much too soon to tell whether it will be sustainable. The strong institutional focus and the work on embedding it within the Tanzanian dairy sector mean that useful outputs are likely to be taken on and outscaled. It also

appears that local and international development partners are learning and may be adapting their practices as a result of their partnership with researchers. It is less obvious that capacity is being built within the national research system. TALIRI has limited staff and SUA appears to be benefiting from opportunities to access funding, but not necessarily building human capacity for changing practice.

Partnerships

(Also see above under question 5.)

The partnership model with key development and research partners is contractual but also collegial and participatory; plans are discussed and issues dealt with in regular meetings and through informal contact. This approach appears to be partly a deliberate strategy and partly the natural inclination of the L&F Tanzania team leader.

The relationship with the government is more distant but cordial – MLFD is represented on the Maziwa Zaidi steering committee and the steering committee member interviewed appears to be conversant with and approve of what L&F is doing.

The partnerships appear to be adding value, as approaches are being implemented (hubs, IPs, the DDF) that would not be possible for any one partner acting alone. However, they do add an extra layer and administration and inevitable transactions costs. There does not appear to be a deliberate attempt to measure value-addition or cost effectiveness, and the team in Tanzania would not be qualified to do this.

Capacity building

The team looked at capacity building for target farmers – which appears to be comprehensive and reasonably demand-driven and is important to the programme strategy – but did not discuss capacity building within partner organizations.

Gender

Gender is well integrated within the research programme, although more evident in published outputs related to dairy goats than those for dairy cattle. The core team in Tanzania has some experience of gender mainstreaming but limited formal training, however, it appears to be well supported by SASI. Social scientists from ILRI-NBO and SUA have been involved in value chain assessments and baseline studies and in planning some of the other research carried out. It seems likely that gender will continue to be well integrated into the research programme and the development work carried out by Heifer and Faida MaLi. It is less certain that it will (or can) be mainstreamed into other organizations that may become involved in outscaling.

Organizational performance

The team did not discuss governance and management questions in any detail but spent a great deal of time with the scientists.

The overall impression is that the Tanzania team has not experienced any human resources problems, other than shortage of staff and heavy workload, or any conflicts. The team leader mentioned privately that he is concerned to ensure that postdocs recruited to the team have the

opportunity to pursue professional development at the same time as serving the needs of the programme, and that it is sometimes a challenge to meet both needs.

The reporting structure (see Section 4) and science oversight is provided by the usual mechanisms (L&F management, governance structures, evaluations). The CG scientists appeared willing to discuss any issues of programme content and quality that were raised by the evaluation team and to provide any documentation requested. They had clearly considered the CCEE report published in 2014 and were attempting to respond to some of its suggestions.

The partnership model previously described, the institutional grounding of the programme and the presence of a local oversight committee all provide opportunities for local stakeholders to provide inputs to programme design, while the high proportion of donor funding ensures participation of bilateral donors. With the exception of NARS partners, most of these stakeholders appear more interested in the development aims of the programme than its research quality.

The greatest risks to continuation and delivery appear to be limited core funding and staff overload throughout L&F. It is not obvious how either of these is being addressed, or how far L&F management can be expected to control them.

4. Additional material

Table 3: Outputs from the Tanzania programme

Paper*	Twine, E. E., Rao, E. J.O., Baltenweck, I. & Omore A, O. 2015. *Credit, technology adoption and collective action in Tanzania's smallholder dairy sector.* Selected Paper prepared for presentation at the 2015 Agricultural & Applied Economics Association and Western Agricultural Economics Association Annual Meeting, San Francisco, CA, July 26-28.
Working Paper	Brandes, R., Saghir, P., Galie, A. & Barasa, V. 2015. *ILRI's experience with the crop and goat project in Tanzania from a gender perspective*. ILRI Discussion Paper 30. Nairobi, Kenya: ILRI.
Paper*	Twine, E. E. & Katjiuongua, H. 2015. *Farm-level and consumption responses to improved efficiency of Tanzania's informal dairy value chain*. Selected Paper prepared for presentation at the 2015 Agricultural & Applied Economics Association and Western Agricultural Economics Association Annual Meeting, San Francisco, CA, July 26-28.
Paper*	Gelan, A. & Omore, A. 2014. Beyond tariffs: The role of non-tariff barriers in dairy trade in the East African community free trade area. *Development Policy Review* 32: 523–543.
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Presentation	Cadilhon, J.-J. 2014. CTA-ILRI African dairy value chain seminar plenary presentation. Presented at the ILRI-CTA African Dairy Value Chain Seminar, Nairobi, Kenya, 21-24 September 2014. Nairobi, Kenya: ILRI.
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Report	Wassena, F.J., Mbeho, A., Kimambo, A.E., Maass, B.L. & Lukuyu, B. 2013. Report of a livestock feed assessment in Mvomero District, Morogoro Region, United Republic of Tanzania. Nairobi, Kenya: CIAT.
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Presentation*	Galie, A. 2013. Integrating gender equity and empowerment in the Dairy Goat and Root Crop Production project: Current issues and next steps. Presented at the Workshop on Integrated Dairy Goat and Root Crop Production, ILRI Nairobi, 19 June 2013. Nairobi, Kenya: ILRI.
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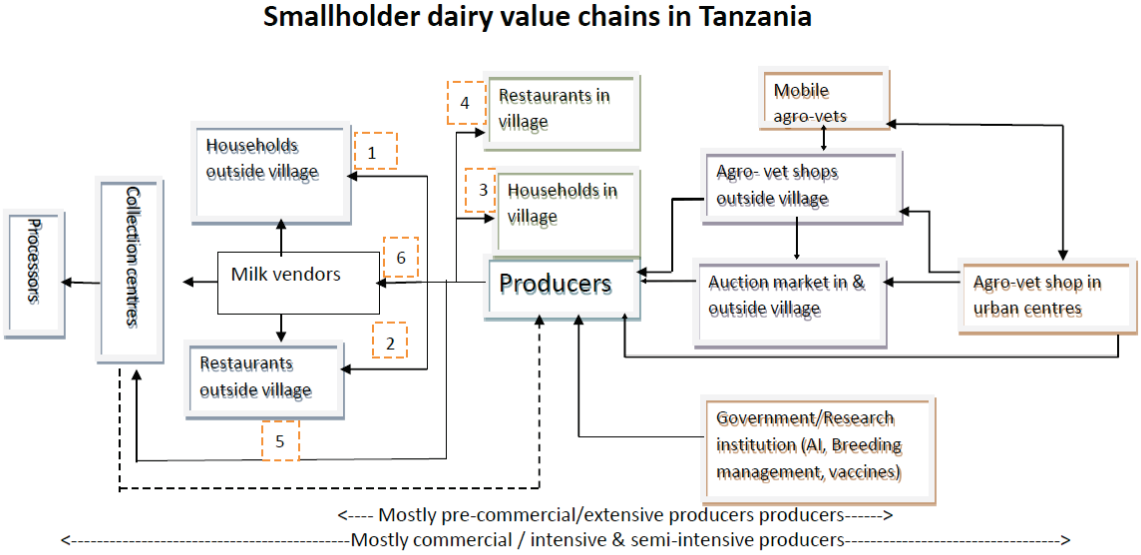
Figure 3: Sketch of smallholder dairy value chains in Tanzania



Key: 1-6 = Milk market channels in order of preference by producers across 8 typical villages in Morogoro and Tanga . These also reflect decreasing price gradient that ranges from TSh 1000/litre for direct sales down to TSh 300/litre for sales to vendors collection centres

Source: Amos Omore.

An approximate breakdown of bilateral funding since 2012 is summarized in the following table. W3 does not appear anywhere. It was difficult to find the W1/2 funding amounts were hazy, so these figures will need to be obtained from Nairobi.

Table 4: Tanzania bilateral funding sources and amounts

Funding sources	Donor	Budget holder	Maziwa Zaidi activities funded	Approximate funding			
				2012	2013	2014	2015
Core funding	W1/2	Omore, ILRI-TZ (formerly held by theme leader)	Core staff and office Site selection, baseline surveys, value chain assessments Consultancies to find sites for IPs Forward-funding postdoc for WOTRO project Forward-funding a gender/forage study				
MilkIT	IFAD	Maass, CIAT-NBO	On-farm forage and feed experiments IP implementation at village level	USD 0.5m			-
MoreMilkiT	Irish Aid	Omore, ILRI-TZ Omore	Development of value chains through "hubs" Funding of Heifer and Faida MaLi development training	USD 0.5m	USD 0.5m	USD 0.5m	USD 0.3–0.5m

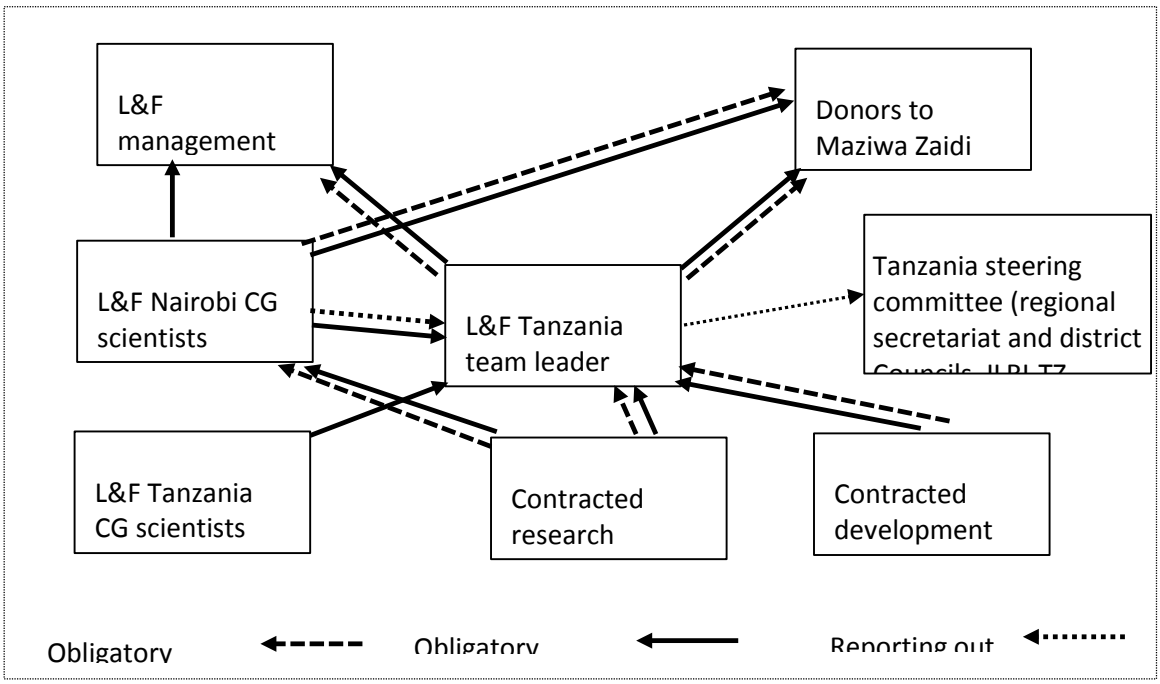
Funding sources	Donor	Budget holder	Maziwa Zaidi activities funded	Approximate funding			
				2012	2013	2014	2015
			Vehicle				
Local and International business collaboration for productivity and quality improvement in dairy chains in SE Asia and East Africa (LIQUID)	NWO-WOTRO Science for Global Development	Twine, ILRI-TZ	Starting 2016. One postdoc and their field activities – management of risk around seasonality	-	-	-	-
EADD Phase II	BMGF	Baltenweck, ILRI-NBO	Experimentation with hub approaches in Southern Highlands – outscaling	-	-	USD 0.2 m	USD 0.2 m
Feed the Future Innovation Lab on Small-Scale Irrigation	USAID via Texas A&M	Lukuyu/Duncan, ILRI-NBO	Fodder irrigation on a small scale	-	-	-	USD 0.15 m (to continue for 3 years)
Dairy Genetics East Africa Phase II	BMGF	Mwai, ILRI-NBO	Survey of genetics in dairy cattle	USD 0.2m	USD 0.2m	-	-
Evaluation of breed composition, productivity & fitness	TDG, AgriTT-DFID	Formerly Mujibe, ILRI-NBO	Long reproductive intervals	-	-	GBP 0.15m	GBP 0.15m

Funding sources	Donor	Budget holder	Maziwa Zaidi activities funded	Approximate funding			
				2012	2013	2014	2015
What's killing my cow? (GIZ)	GIZ	Unger, ILRI-VN	Survey of diseases affecting smallholder dairying	-	EUR 0.8m	-	-
Scaling up the delivery of ITM in Tanzania through facilitation of ITM delivery value chain	USAID	Rao, ILRI-NBO	Survey of delivery approaches	-	-	-	Not yet signed up
Experimental impact assessment household-level impacts of ECF control by the ITM	SPIA	Rao, ILRI-NBO	Research on economic impact of ITM	-	-	-	Not yet signed up
Safe Food Fair Food 2	BMZ	Grace, ILRI-NBO (A4NH)	Food safety in informal milk markets	USD 0.5m			-
Rapid assessment of potential benefits to human health and nutrition from research on livestock and fish market chains	ACIAR	Grace, ILRI-NBO (A4NH)	Vet Epi: backup for review of zoonoses; Rapid impact assessment of Food security & nutrition (with RVC); multi-pathogen prev survey (with F. Unger, P. Toye, S. Alonso; Risk assessment & management for milk safety (with K. Roesel)	-	AUD 0.25m	-	-
Study on "Looking beyond income: impact of hubs on human nutrition in Tanzania"	SPIA	Baltenweck, ILRI-NBO	Survey	-	-	-	USD 0.1m

Funding sources	Donor	Budget holder	Maziwa Zaidi activities funded	Approximate funding			
				2012	2013	2014	2015
Leveraging Dairy Value Chain Development in Tanzania for Improved Nutrition and Health of Women and Children	USAID	Grace, ILRI-NBO (A4NH)	Work done in collaboration with "Looking beyond income: impact of hubs on human nutrition in Tanzania"	-	-	USD 0.05m	-
Cleaned	BMGF	Lennerstat, ILRI-NBO	Framework for ex-ante environmental assessment	-	USD 0.735m		-
Potential farm to landscape impact and adoption of forage technologies in smallholder dairy production systems in Tanzania	BMZ small grant	Paul, CIAT-NBO	Gender issues in adoption of forage	-	-	-	EUR 0.1m

Source: Bilateral project list provided by L&F management unit. Values in USD million.

Figure 4: Tanzania reporting structure



Note: obligatory vs courtesy reporting is defined by budget holding.

F4: Nicaragua research hub

Written by Anni McLeod. Based on the visit report by Anni McLeod and Peter Udén. 1 October 2015

1. Overview of the programme

Development context

Milk and cattle meat, primarily from dual-purpose cattle, are the largest products by volume from the Nicaraguan livestock sector, and production is growing. Chicken meat production and egg production have, respectively, grown faster than cattle meat and eggs over the past ten years, but starting from a much lower base. The cattle population has grown by only 7 percent in ten years, while cattle meat production has increased by 65 percent and milk production by 34 percent over the same period (FAOSTAT[10]).

L&F in Nicaragua works on dual-purpose cattle, targeting small-scale livestock keepers. These animals are important in providing income to smallholder families from sales of milk and young animals into beef value chains.

However, smallholder livestock keepers face challenges from:

- Pressure on land.
- **Climate change**, particularly in the drier areas of the country. This has exacerbated seasonal feed shortages and the land degradation problems that were already occurring because of land pressure and poor NRM. Farmers have to cope with increasingly long dry periods as well as occasional flooding and waterlogging during the rains.
- **Market requirements**. Domestic demand for beef continues to grow, but demand for dairy products is almost saturated and demand by local processing companies is unpredictable. Nicaragua is developing an export market to neighbouring countries, particularly for processed products such as local cheese. However many small-scale producers cannot meet the quality demands of urban and export markets. Government extensions services are limited but a number of NGOs assist smallholder producers to improve their production levels and quality standards. CEI (www.cei.org.ni) supports small and medium enterprises to enter the export sector.

Basic statistics provided by the L&F team:

Herd size		> 5 000 000
Area of Nicaragua		129 494 km^2
Proportion occupied by livestock		28.3% (36 839 km^2)
Productivity		Milk: 3–4 litres/animal/day Meat: 200 g/animal/day
Annual deforestation		70 000 ha
Proportion degraded pastures		> 60%

[10] Accessed July 2015

Notwithstanding the problems of dairy production, cattle remain popular with smallholder producers. A number of cooperatives are attempting to tackle the problem of uncertain markets.

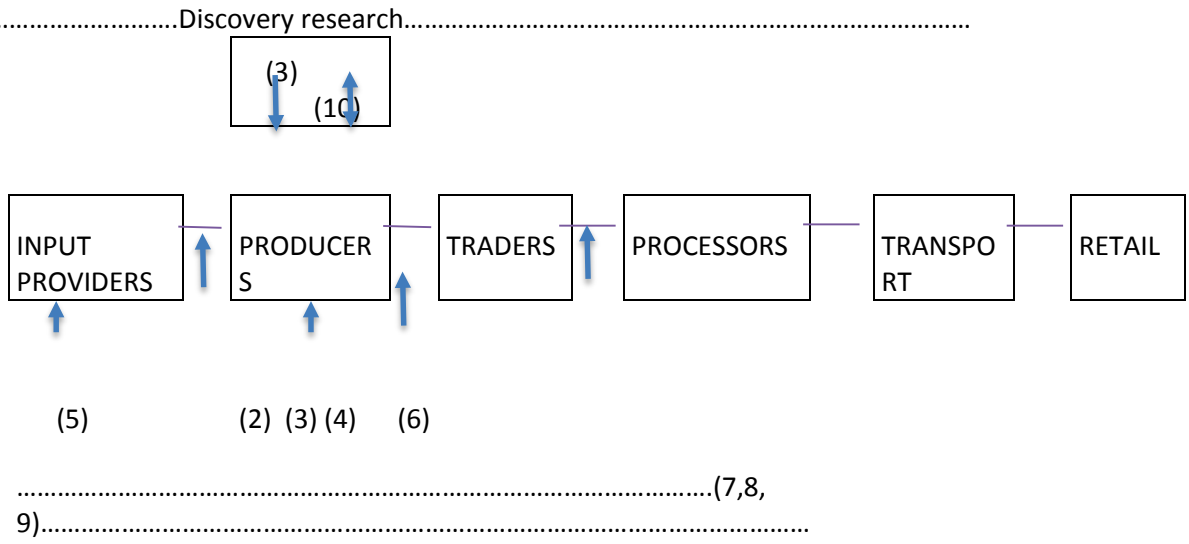
L&F approach and programme portfolio

The CG in L&F Nicaragua is represented by CIAT (Nicaragua, Colombia) and ILRI.

The L&F team and partners have identified several areas of interest. These include: reducing the degradation of natural resources; ensuring that feed is available throughout the year; helping farmers to become more entrepreneurial and produce higher quality products; and improving marketing skills and channels.

Research is most strongly focused on NRM and feed availability and on gender aspects of dairy production and marketing. We saw strong evidence of action research with farmers and of the involvement of women's cooperatives in both research and development activities. The programme's work on markets and farmer entrepreneurship is done mainly through its close association with cooperatives and CEI. L&F has a bilateral project on improvement of cattle breeds but to date it has only done a baseline study.

The work of L&F is quite strongly concentrated at the producer end of the value chain.



Discovery flagships have made contributions in the form of tools and germplasm.

Discovery research activities and funding sources:

- SASI – development of tools for environmental assessment (e.g. CLEANED) (in Nairobi) (1);
- SASI – development of tools for gender assessment in value chains (in Nairobi);
- F&F – development of grasses adapted to temporary drought and flooding conditions (mostly in Colombia) (8).

Value chain research activities (see section 2):

- testing of hybrid grasses tolerant to drought and flooding (2);
- FFS on best practices for livestock management to minimize greenhouse gas emissions (3);
- identification of cattle breed types that best match smallholder production systems (4);
- building capacity on cattle breeding (5);
- partnership with co-ops and women's groups (6);
- assessment of needs along the value chain (7);
- gender mainstreaming of L&F work (8);
- work planned on carbon markets (9).

Although the "official" L&F value chain in Nicaragua is dual-purpose cattle, some work has previously been done on feeding of tropical forage legumes to pigs.

The majority of operational funding is from bilateral projects. See Section 2 for a breakdown.

The L&F team has built a useful network of local and regional research and development partners.

Local research partners are:

- INTA, the NARS of Nicaragua. It has a long-standing partnership with CIAT, mainly on beans, cassava and forages, and now works with L&F on field-testing of forages and silvo-pastoral systems.
- UNA. It has had a continuous partnership with CIAT and presently also works with ILRI. Collaboration is mainly on NRM (silvo-pastoral systems, soils) and animal science (forages, genetics). UNA is a partner in the project on biological nitrification inhibition, and various other activities.
- CATIE (www.catie.ac.cr), a leading research institution and regional higher education centre in agriculture, agroforestry and NRM in Latin America. Its strength is in the application of an integrated approach that combines research, education and technical training as tools to promote rural development. It has been a source of key innovations that have been incorporated into national and regional development programmes, including sustainable alternatives for agriculture, agroforestry and forest management in traditional farming areas and borders; assessment of environmental services; participatory methods of research and training; applications of geographic information systems; and new proposals for handling protected areas and buffer zones. CATIE is a partner in several activities, for example, the project on sustainable livestock with focus on the dual-purpose cattle value chain.

Local development partners are:

- ADDAC, an NGO that was founded in 1989. Its assembly has 21 members and it partners with six cooperatives. It has several projects and initiatives within the territory covered by the L&F intervention sites, on food security; agribusiness for income generation (focusing on cacao, coffee, milk, honey, passion fruit and black beans); strengthening of local organizations and cooperatives; and individual, institutional and cooperative credit (an estimated USD 1.5 million provided to some 3 000 clients).

- ASOGAPCON, an association of livestock keepers and farmers of Condega. It is a local NGO based in the municipality of Condega, in the department of Estelí. Most of its activities are strongly related to livestock; they include veterinary services, development of business plans for farms, environmental plans based on watersheds and genetic improvement of cattle. It also runs a veterinary pharmacy.
- CEI (www.cei.org.ni). Formed in 1992, this non-profit private corporation supports micro, small and medium enterprises, organized and/or individual producers, with the objective of improving the competitiveness of Nicaragua´s export sector and achieving successful entry into the international markets. It is a partner in the project on sustainable livestock, focusing on the dual-purpose-cattle value chain
- Heifer International Nicaragua. This organization originated in the School of Agriculture and Livestock, Estelí, which provided the initial delivery of goats in 1977. In 2001, Heifer International Nicaragua was registered by the Government of Nicaragua as a branch office of Heifer International. Heifer Nicaragua provides resources and capacity building to smallholder farmers in an effort to achieve food and nutritional security, and is a partner in several L&F activities (e.g. the project on sustainable livestock with focus on the dual-purpose-cattle value chain).
- NicaCentro**,** a cooperative organization with 1000 members. It currently operates eight milk collection centres and is in the process of opening two more. The ten centres are located in five municipalities. NicaCentro provides milk collection and commercialization services and provides its partners with free technical assistance, reduced-price agro veterinary products and financing. Its projects have focused on increasing milk production per cow and guaranteeing affordable feed, and have included the implementation of biodigesters and FFS. It is an important partner in the project on sustainable livestock.
- Solidaridad Network, (www.solidaridadnetwork.org) an international NGO with a focus on value chains. It is an implementing partner in the project on sustainable livestock, with strong emphasis on the dual-purpose-cattle value chain.

Other important local stakeholders include:

- Ministry of Agriculture and Forestry. The L&F team maintains contact with the ministry but does not work directly with it.
- IICA, the specialized agency of the Inter-American System for agriculture. It supports the efforts of its member states to achieve agricultural development and rural well-being through international technical cooperation. It offers technical support for improving the productivity and competitiveness of the agricultural sector: strengthening agriculture's contribution to the development of rural areas and the well-being of the rural population, improving agriculture's capacity to mitigate and adapt to climate change and make better use of natural resources, and improving agriculture's contribution to food security.

2. Highlights

Established and working well

- L&F is working in a relevant value chain (dairy production carried out by many households, including poor ones, a good income provider). For the future it could be useful to: look at calf nutrition (an under-researched area) – calves are sold by dairy households at 110 kg to beef-raising households; review the role of backyard poultry in food security – if the remit of each value chain site expands it may be relevant to work on poultry.
- L&F has formed strong partnerships with national research partners (UNA) and development partners (Heifer, CEI, Solidaridad, women's group, co-ops). UNA and Heifer stated that they consider their partnership with CIAT to be strategic. The NicaCentro co-op is also approaching the partnership as a strategic one. L&F also has a regional research partnership with CATIE. The partners all say they are learning through working with L&F. It was evident from discussions that each partner can pursue their own goals while contributing to the partnership – this should be good for sustainability. Information generated through the partnerships does not seem to be consolidated or systematically documented. Bringing together information on the impacts of various partner activities mapped to L&F could be a useful research activity. It would also be valuable to develop a more coherent work plan.
- There is clear strategic alignment with L&F goals. The programme is attempting to address both "by" and "for" the poor, although activities to date have mostly focused on "by". They work with a range of partners each addressing different issues (e.g. environment, small-scale farmer productivity, access to export markets by small and medium enterprises). They are able to articulate how the programme can contribute to IDOs.
- There has been a clear progression from work done by the F&F "discovery" flagship to field research in Nicaragua, where grass cultivars developed by CIAT HQ are being tested under farm conditions and subjected to farmer evaluation.
- There is effective mainstreaming of gender. All scoping and value chain assessments have had a gender component, on-farm work includes women and men and takes account of the preferences of both. Gender research is of high quality and is visible in published material. There has been some gender capacity development of L&F researchers and local partners.
- There has been reasonable progress with planned activities. There is evidence that adaptive research is being carried out on feeding strategies suitable for local conditions and cattle-rearing practices suitable for provision of environmental services, including silvo-pastoral culture. (It is less clear whether there is any actual research on animal genetics or milk quality, although the latter is being addressed by development partners through farmer training).
- The team has been fairly effective in obtaining bilateral funding, sufficient to keep the programme running (but see also the first point under Constraints/vulnerabilities/gaps).

Emerging and interesting

- There has been discussion on the volatility of the milk market and the ways that development partners, especially co-ops, are planning to address this (e.g. though collaborative action between co-ops and efforts to expand exports of artisan cheese). Currently there seems to be a disconnect between the focus of L&F's research at the production end of the value chain and the very big problem of assuring a market for smallholder producers. It may be useful in future to bring in an economist to study the problem of milk market uncertainty and work on business models.

- Strong development partners provide a route for transferring research findings to farmers. Currently this is being done on a small scale through FFS, farmer trials and training provided by Heifer. A strategy is needed for taking the next step to reach farmers on a much larger scale. In addition, the partners are very vocal in urging CIAT to "join up" the different parts of the programme into a coherent system (although it is not clear precisely what they mean by this). It would be useful to map the scaling process along the impact pathways, to show which partner(s) are likely to have primary responsibility for each stage of scaling and what will need to be done to ensure that scaling can occur. At the same time a plan could be made for research into scaling processes.
- A number of manuals for farmers are in the pipeline. This will be a useful output contributing to impact. There may also be value in producing training videos (one farmer interviewed has produced his own video of the process he uses for ensiling).
- The programme has a strong "action research" ethos: farmers are testing technology, evaluating it and developing new ways to test it. It is challenging to get good data under farm conditions but we encourage the L&F team to record as much as possible, using both quantitative and qualitative methods.

Constraints/vulnerabilities/gaps

- The core team is barely at critical mass. This affects:
    - the geographical scope of work (e.g. the team feels it is important to do more work in the drier areas of the country where poverty is highest and the need for improved forage management is greatest, but does not have the human resource to expand the field programme in this area);
    - the technical scope of work (e.g. there is need for economic studies but the team has no economist and it has been impossible to obtain sufficient economist time from CIAT HQ to initiate the work);
    - collaboration/integration with other CRPs and partners (e.g. having few staff restricts the potential for developing truly "joined up" work plans);
    - the ability to develop bilateral funding proposals.
- Limited and volatile core funding has affected this value chain, as it has others, by limiting the scope and scale of what can be done. Uncertainty of funding is a particular concern as it reduces the ability to plan in advance.
- The gender programme is progressing well in Nicaragua and a gender community of practice works fairly effectively across the CRP, but currently L&F has no senior gender researcher (the former senior researcher, Dr Colverson, has left). If this situation continues it could jeopardize future progress and strategy development, particularly in transitioning to Phase 2.
- Having invested much time and effort in building relationships with research and development partners and initiating programmes with farmers, the team in Nicaragua is concerned about the positioning of L&F and related work (e.g. Humidtropics) in the Phase 2 of CRPs.
- Animal health is almost invisible in the programme. It does not appear to be a major constraint in smallholder dual-purpose cattle, but neither has it been thoroughly investigated. It is possible

that livestock disease is contributing to poor milk quality. The recent appointment of a herd health expert as leader of the Animal Health flagship may provide an opportunity to investigate links between cow health and milk quality.

- The cattle breed situation is confusing. Genetics may be contributing to low yields – in the snapshot of farmer experience related to the evaluation team, farmers did not always get the responses that would be expected from improved forages – but there is insufficient information to begin making an assessment of the situation. A first step would be to introduce body condition scoring of animals as a means to evaluate milk production responses to interventions.

Additional comment

The team leader can describe the L&F TOC but does not find it particularly useful for strategy or management.

3. Findings against evaluation questions

This section expands on and adds to the highlights presented in section 2.

Overarching questions

1. Is the maxim "more meat, milk & fish – by & for the poor" credible and realistic?

L&F Nicaragua is attempting to work on both but mostly focusing on "by". It does not work on consumption and, unlike some other value chain countries, has not teamed up with A4NH to work on food safety.

Conceptually the L&F team believes that improved productivity (including lower production costs) will be beneficial to poor producers and poor consumers (including female-headed households), while improved food safety will be beneficial to poor consumers (and presumably necessary for producers to access markets). However there has been no research to demonstrate proof of concept. Neither has there been any serious attempt to separate the financial impact of improved NRM in existing carbon markets from its global public good impact.

2. CRP Flagship coherence: Is there a valid, demonstrable and logical contribution of the discovery flagships to the broader value chain-centred delivery flagship, and vice versa?

Although Nicaragua is testing forages (mostly grass cultivars) produced by CIAT HQ with some relevance to Nicaraguan conditions (drought hardiness and acid soils tolerance), CIAT HQ does not appear to be taking account of several needs articulated by Nicaragua. Much of the initial work on development of grass breeds done by CIAT was a response to Brazilian needs and the work has been funded partly by royalties for seed from Dow Agrochemicals. Recent work on cultivars tolerant to drought and waterlogging does reflect the needs of Central American farmers but it is not evident that they were developed mainly with this need in mind or in response to surveys done in Nicaragua.

Further, the work in Nicaragua highlights potentially important research areas for SASI, or for VCTS as a whole, that do not appear to be addressed in a comprehensive coherent way under the current work programme (NB this needs to be verified). These areas are:

- whether “by” and “for” the poor are always trade-offs or can be complementary;
- the benefits and costs of providing environmental services to smallholders compared to their global public good impact – this is an ongoing conversation and one to which L&F should be contributing;
- the institutional learning that takes place when research and development partners work together with farmers (the Tanzania dairy VALUE CHAIN programme is documenting the institutional learning taking place, but similar exercises do not appear to be happening in other VALUE CHAINs).

Animal health is almost invisible in the programme. It does not appear to be a major constraint in smallholder dual-purpose cattle, but neither has it been thoroughly investigated. It is possible that livestock disease is contributing to poor milk quality. The recent appointment of a herd health expert as leader of the Animal Health flagship may provide an opportunity to investigate links between cow health and milk quality. However the lack of animal health expertise within the Nicaragua team and the distance from Ethiopia (where the expert is based) means that there may not be strong pressure on the new flagship leader to lend her expertise.

The cattle breed situation is confusing. Genetics may be contributing to low yields – in the snapshot of farmer experience related to the evaluation team, farmers did not always get the responses that would be expected from improved forages – but there is insufficient information to begin to make an assessment of the situation. A first step would be to introduce body condition scoring of animals.

3. Does L&F have sufficient capacity (in all senses) to deliver on the promise of a value chain approach to enhancing the roles of livestock and fish?

Like other value chain sites, the Nicaraguan team is too small for all the work it has to do. It is an active team and has established a solid programme, but the small size of the team has affected:

- the geographical scope of work (e.g. the team feels it is important to work more in the drier areas of the country where poverty is highest and the need for improved forage management is greatest, but does not have the human resource to expand the field programme in this area);
- the technical scope of work (e.g. there is need for economic studies and development of business models but the team has no economist and it has been impossible to obtain sufficient economist time from CIAT HQ to initiate the work; the evaluation team also noted that some of the problems experienced by smallholder dairy farmers could be linked to poor animal health, but this area has not been explored – it was dismissed as “not a problem” but has not been thoroughly investigated);
- collaboration/integration with other CRPs and partners (the programme works well with CCAFS but does not appear to work with other CRPs; during our meetings, a partner raised the concern that there is not yet a fully “joined up” work plan, and the L&F team explained that they see the value of this but have not had time to do all of the necessary work to develop one);
- the ability to develop bilateral funding proposals (although L&F has been fairly successful in soliciting bilateral funding, it needs further funding in specific areas, e.g. gender research, economics).

4. What has been the added value (if any) of integrating previous livestock and fish research programmes into the CRP?

The work on forages has benefited from legacy work by CIAT. For example, grasses previously developed at CIAT in Colombia are being refined for Nicaraguan conditions, and evaluated and, in some cases, adopted in Nicaragua.

5. Does L&F have the appropriate partners for research on value chains, and is it using the right partnership models and principles?

See below under Partnerships. L&F has chosen appropriate partners for the technical and development work it is doing within the dual-purpose-cattle value chain. It does not have strong partners for "value chain research" (the same can be said of other L&F value chain countries).

6. How is gender explicitly integrated into the CRP to enhance impact?

The L&F team made a conscious decision to mainstream gender into the programme and backed it up by hiring a full-time national researcher qualified to master's level. Although there is no bilateral funding devoted to gender, W1/2 funding has supported survey work and it was clear to the evaluation team that the gender researcher is well embedded in many of the programme activities. There has also been some gender capacity development of L&F researchers and local partners.

As a result there has been highly effective mainstreaming of gender.

All scoping and value chain assessments have had a gender component, and on-farm work includes women and men and (to the extent possible in local conditions) takes account of the preferences of both. Local women's groups have been involved in FFS and on-farm research, with the dual impact that gender issues are being uncovered in the research and the women's groups are visible within local discussions about dairy development.

7. To what extent has L&F leveraged capacity across the CGIAR centres?

The work in Nicaragua is strongly led by CIAT but has a presence from ILRI (some of the national team members).

9. How well has L&F delivered to date against planned outputs?

The Nicaragua programme has delivered reasonably well against work plans and produced some interim outputs. It has not yet produced many final outputs or made much progress towards outcomes.

There is evidence that adaptive research is being carried out on feeding strategies suitable for local conditions and cattle-rearing practices suitable for provision of environmental services, including silvo-pastoral culture. The team saw field activities in progress, and some research briefs and reports have been produced. It is less clear whether there is any actual research on animal breeding or milk quality although the latter is being addressed by development partners through farmer training.

10. To what extent do governance and management arrangements in L&F help it to reach its SLOs and IDOs?

The team appears to have a good relationship with CIAT (as might be expected) and a cordial although more distant relationship with ILRI. CIAT's representative in Nicaragua was present at our meetings in Managua, appeared to be well briefed on the programme and was reported by the team leader to be helpful in facilitating relations with government organizations in particular.

Although the team must face similar challenges of high reporting demands and cumbersome financial systems to other value chain teams, they talked very little about this.

The team members were, however, very concerned about the sustainability of funding, the challenges of maintaining sufficient critical mass and the future of L&F and other CRP work in Phase 2. Uncertainty about the future is destabilizing and demoralizing for this team as for others.

11. Does L&F adequately cover poultry research (given the documented demand, nutritional value and opportunities offered by poultry)?

See under Relevance. Reviews done by FAO during the global avian influenza crisis suggested that backyard and small-scale poultry have greater importance to local food security in Central America than in many other places. For the future there would be merit in reviewing their role in Nicaragua and investigating whether there would be value in expanding the programme to include poultry.

12. Does L&F adequately cover NRM and environmental issues associated with livestock and fish that are not captured within other CRPs?

NRM and environment are a strong focus of L&F's work in Nicaragua, which is done in collaboration with CCAFS.

13. Does L&F adequately cover post-harvest opportunities for value addition and loss avoidance that are not captured by livestock and fish research in other CRPs?

Needs assessment with partners identified quality of products to be an area that is of interest to smallholders. There is also a national interest in value-adding through processing for both national and export markets. Currently L&F does no research in these areas, although it works with national partners (CEI, NicaCentro) that are exploring the potential for markets for "artisanal" processed products.

Relevance

There is clear strategic alignment of the Nicaragua programme with L&F goals and the team is able to articulate how the programme can contribute to the L&F IDOs. L&F works with a range of partners each addressing different issues (e.g. environment, small-scale farmer productivity, access to export markets by small and medium enterprises).

L&F is working in a relevant value chain. Dairy production and the sale of calves are said to be good income providers for smallholder households. However, there are constraints on selling milk as the domestic market is periodically over-supplied and sale to processors is unpredictable. Although cooperatives and others such as CEI are working to improve the milk market, in the short term L&F is putting a great deal of effort into increasing and stabilizing production for a market that has unpredictable demand.

There is an ongoing discussion on the volatility of the milk market and the ways that development partners, especially co-ops, are planning to address this (e.g. through collaborative action between co-ops and efforts to expand exports of artisan cheese).

The evaluation team suggested that it would be worth **r**eviewing the report that the economic development office in Matigua is expecting to produce with their grant from Swiss Aid and if necessary bringing in an economist to study the problem of milk market uncertainty.

It would also be worth investigating calf nutrition by smallholder households, as this appears to be an under-researched area. Calves are sold by dairy households at 110 kg to beef-raising households.

Food crop by-products could also be explored further. There should be approximately one million tonnes of cereal and legume stover available for use as feed according to FAOSTAT[11].

Quality of science

The research done in Nicaragua is applied and of a practical nature. It appears to be well planned and in some cases draws on legacy work. The team leader is an experienced field researcher and the team has good links with CIAT for work on forages. The gender research, as described to the evaluation team, appears to be generally of high quality. Published outputs are limited and consist mainly of posters, meeting presentations and reports. Very few peer reviewed papers were published and only with Nicaraguan staff as co-authors. Therefore, it is hard to comment on the quality that will eventually emerge. As mentioned elsewhere in this report, opportunities to publish about on-farm learning and institutional learning may be lost because they are not being systematically recorded.

Effectiveness and research efficiency

L&F has established a solid programme of forage development and testing and sustainable management of feed resources. It has maintained and developed partnerships established previously by CIAT and built new ones. It has leveraged what partners are already doing and its partnership with CCAFS. In all of these areas it has been effective and, probably, efficient. L&F has added value by bringing together partners that might not otherwise collaborate as strategically or purposively.

The team would be more effective if it was larger. It might also be more effective if it was not the only L&F team in the region, but had others with which to collaborate (however this is an open question since the VALUE CHAIN teams in Africa do not appear to collaborate much and neither do those in Asia).

Impact and Sustainability

Strong development partners provide a route for transferring research findings to farmers. Currently this is being done on a small scale through FFS, farmer trials and training provided by Heifer. A strategy is needed for taking the next step to reach farmers on a much larger scale. In addition, the

[11] Accessed July 2015.

partners are very vocal in urging CIAT to "join up" the different parts of the programme into a coherent system (although it is not clear precisely what they mean by this).

It would be useful to map the scaling process along the impact pathways, to show which partner(s) are likely to have primary responsibility for each stage of scaling and what will need to be done to ensure that scaling can occur,.At the same time a plan could be made for research into scaling processes.

A number of manuals for farmers are in the pipeline. This will be a useful output that contributes to impact. There may also be value in producing training videos (one farmer interviewed has produced his own video of the process he uses for ensiling).

The programme has a strong "action research" ethos: farmers are testing technology, evaluating it and developing new ways to test it.

One concern is that much of what farmers are learning is not being systematically recorded and reproduced in ways that will spread the impact. It is challenging to get good data under farm conditions but the L&F team does need to record as much as possible, using both quantitative and qualitative methods.

Partnerships

The L&F team has built strong partnerships with UNA and with INTA. It was evident in our initial meeting that UNA regards this as a strategic partnership, while the practical partnership at field level with INTA was observed during our field visit. CATIE, based in Costa Rica, is also a strategic and practical research partner. L&F has benefited from and built on previous collaboration between these organizations and CIAT. Each organization has both a local (in the case of CATIE regional) mandate and research strength in specific areas.

L&F also works with several development partners (listed in section 1). Heifer International Nicaragua stated that they consider the relationship to be a strategic one. (NB L&F has also established a strong partnership with Heifer in Tanzania, however it is not clear whether there is lateral communication between the two national Heifer teams). Heifer brings the experience of working with dairy farmers and farmer groups, albeit using their own development model.

CEI also stated that they consider their partnership with CIAT to be strategic. They bring a strength that L&F lacks, that of negotiating with the Nicaraguan government, and the governments of potential export partners, on trade issues. They also have strong links with the private livestock sector including large-scale producers and cooperatives.

The NicaCentro co-op is also approaching the partnership as a strategic one. NicaCentro has a strong interest in negotiation with large processors (and potentially retailers) to stabilize milk markets for their members. As such it is an important partner: without an improved milk market L&F's target famers will be unable to benefit from the improved technology and management research outputs that the programme is providing. 24 Junio, a smaller cooperative with two collection centres, collaborates loosely with NicaCentro and with L&F. Dairy cooperatives are important partners for

L&F as they have a growing membership and provide marketing opportunities, technical assistance (mainly quality testing) and in some cases credit to members.

The partnership model adopted by L&F seems to be a pragmatic one involving working on joint projects and gaining experience together. Key partners all say they are learning through working with L&F. It was evident from discussions that each partner can pursue their own goals while contributing to the partnership – this should be good for sustainability.

Our main concern in L&F's partnership model is that information generated through the partnerships does not seem to be consolidated or systematically documented. This means that opportunities to build institutional capacity and produce research outputs are being lost. Bringing together information on impacts of various partner activities mapped to L&F could be a useful research activity. It would also be valuable to develop a more coherent work plan.

Capacity building

We did not explore this aspect of L&F's work in detail. It is evident that there is "on the job" learning by the L&F team and their partners but little was said about training activities, other than field schools for farmers. As mentioned above, there could be excellent opportunities for institutional learning if the experience of the partners was routinely shared and documented, but at present this is not happening.

Gender

See question 5.

The gender programme is progressing well in Nicaragua and has produced interesting published outputs. The gender researcher has been assisted and mentored by L&F's gender community of practice, which appears to have established an effective informal communication through blogs and other electronic communication. Formerly, she was also mentored by the senior gender researcher based in Nairobi, Dr Colverson. However L&F currently has no senior gender researcher as Dr Colverson has left ILRI and no longer works for the CGIAR. If this situation continues it could jeopardize future progress and strategy development, particularly in transitioning to Phase 2.

Organizational performance

See question 10.

4. Additional material

Table 5: Nicaragua porgramme outputs

Presentation*	Mena, R. 2014. Análisis de cadenas de la leche en Nicaragua: Madriz, Nueva Segovia, Jinotega y Matagalpa. Presented at Taller de Planificación de Cadenas de Valor de Ganado en Nicaragua, Managua, 5–6 de agosto de 2014. Managua, Nicaragua: CIAT.
Presentation	Mora, A. 2014. Género en cadenas de valor ganaderia de doble propósito en Nicaragua. Presented at Taller de Planificación de Cadenas de Valor de Ganado en Nicaragua, Managua, 5-6 de agosto de 2014. Managua, Nicaragua: CIAT.
Report*	Mora, M.A. & Lindo, P. 2014. Report of the Livestock and Fish workshop on gender in dual-purpose livestock value chains, Nicaragua, 21–22 January 2014. Cali, Colombia: CIAT
Report	Mora, M.A. & Lindo, P. 2014. *Reporte del Taller de* Género *de Livestock and Fish*, Nicaragua, 21–22 January 2014. Cali, Colombia: CIAT
Report*	Lovo, I. & Mora, M.A. 2014. Caracterizacion y mapeo con enfoque de género de organizaciones y actors en la cadena de valor de ganadería de doble proposito en Camoapa y Matiguas. Managua, Nicaragua: CIAT.
Poster*	CIAT. 2013. Nicaragua smallholder dual-purpose cattle value chain's "Intermediate development outcomes. Poster. Cali, Colombia: CIAT.
Poster	CIAT. 2013. Nicaragua smallholder dual-purpose cattle value chain's"What you need to know. Poster. Cali, Colombia: CIAT.
Poster	CIAT. 2013. Nicaragua smallholder dual-purpose cattle value value chain's"The basics. Poster. Cali, Colombia: CIAT.
Presentation	Bustos, G. 2013. Gender equity and equality in the MAP Norway Project in Nicaragua. Presented at the Livestock and Fish Gender Working Group Workshop and Planning Meeting, Addis Ababa, Ethiopia, 14–18 October 2013. Turrialba: CATIE
Report*	CIAT. 2013. Report of the Nicaragua dual purpose livestock value chain, impact pathways and planning meeting, Managua, Nicaragua, 5–9 August 2013. Cali, Colombia: CIAT.
Report	CIAT. 2013. Taller de Rutas de Impacto y Planificación de Livestock and Fish Cadena de Valor de Doble Proposito en Nicaragua, Managua, Nicaragua, 5–9 August, 2013. Cali, Colombia: CIAT.
Report*	Kidoido, M.M., Korir, L. & Hoek, R. Van der. 2013. *Nicaragua dual purpose cattle value chain impact pathways narrative.* Nairobi, Kenya: ILRI.
Report*	CIAT. 2013. Competitive beef and dairy through sustainable intensification and specialized market access in Nicaragua. Cali, Colombia: CIAT.
Conference Paper	Hoek, R. van der, Mendoza, B., Mena, M., Bonilla, G., Pavón, J., Téllez, O., Rousseau, L., Fonte, S., Lavelle, P., Castro, A. and Rao, I. 2012. *Advances in integration of agroforestry based crop-livestock systems in the hillsides of Nicaragua.* Paper presented at the Second International Symposium on Integrated Crop-livestock Systems. Porto Alegre, Brazil, 8–12 October 2012. Cali, Colombia: CIAT.
Journal Article*	Douxchamps, S., Frossard, E., Uehlinger, N., Rao, I., Hoek, R. van der, Mena, M., Schmidt, A. & Oberson, A. 2012. Identifying factors limiting legume biomass production in a heterogeneous on-farm environment. *J. Agricultural Science* 150(6): 675-690.

Report	CIAT. 2012. Notes from the Livestock and Fish Nicaragua dairy value chain workshop, Managua, Nicaragua, 25-26 October 2012. Cali, Colombia: CIAT.
Journal article*	Galie¨, A., Mulema, A., Mora Benard, A.M., Onzere, S. & Colverson, K. 2015. Exploring gender perceptions of resource ownership and their implications for food security among rural livestock owners in Tanzania, Ethiopia, and Nicaragua. *Agriculture and Food Security* 4: 2.
Presentation*	Mora, A.M. 2015. Gender in the dual purpose cattle value chain Nicaragua. L&F Gender Working Group Workshop, 8–12 June, 2015
Manuals	Manuals on silage-making have been produced and are to be printed.

*These documents were reviewed for the case study.

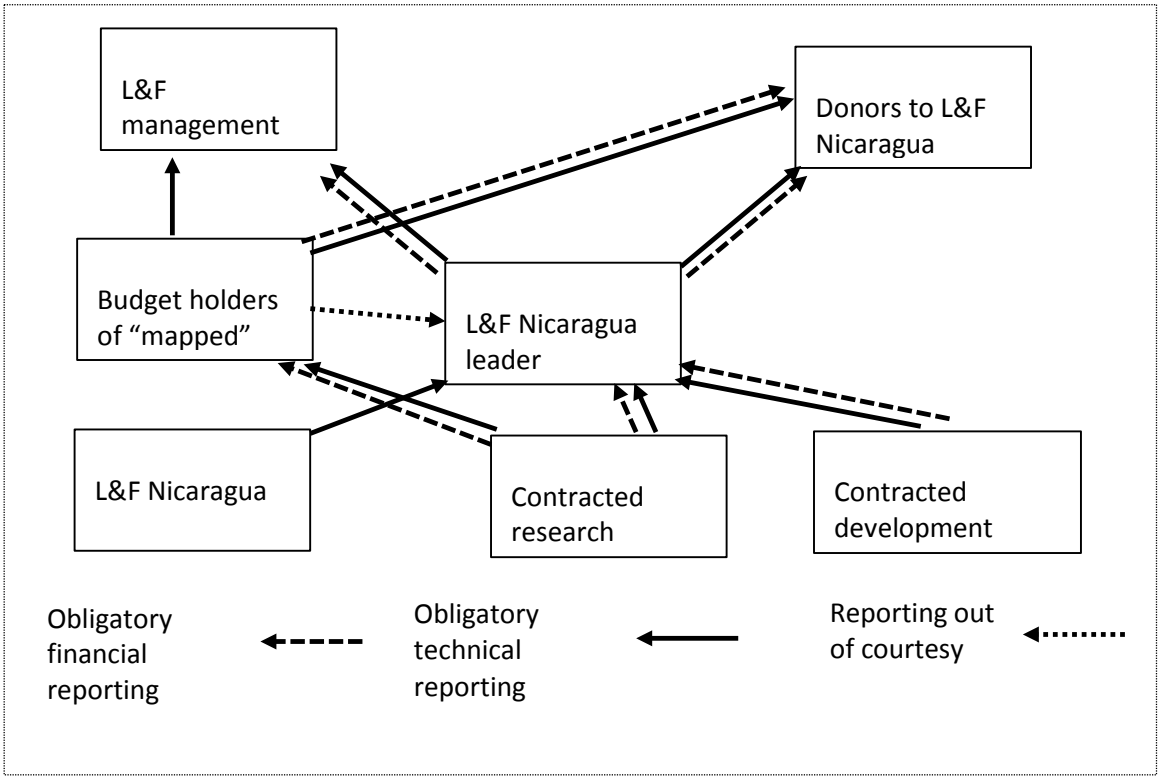
An approximate breakdown of funding since 2012 is summarized in the following table. W3 does not appear anywhere. The L&F team leader did not know the amount of W1/2 funding but said it was not large.

Table 6: Nicaragua funding sources

Funding sources	Donor	Budget holder	L&F activities funded	Approximate funding			
				2012	2013	2014	2015
Core funding	W1/2	M. Peters	Work at Matiguás, Camoapa, Estelí, Condega (NIC). Exact budget unknown. Value chain assessments; gender studies.			xx	Xx
EFX73. Climate-smart Crop-livestock Systems for Smallholders in the Tropics: Integration of New Forage Hybrids to Intensify Agriculture and to Mitigate Climate Change through Regulation of Nitrification in Soil	GIZ-BMZ	M. Peters/R. Idupulapati	Work at Camoapa, Nueva Guinea. Experiments with 36 hybrids of *B. humidicola*, selection of 20 hybrids apparently tolerant to drought and waterlogging, studies on soil profiles, exchanges on farmer evaluation and selection criteria.	15 000			
EFS30. Competitive beef and dairy through sustainable intensification and specialized market access	Solidaridad	R. van der Hoek	Work through FFS on best practices for livestock management to minimize greenhouse gas emissions and business plans for farmers.		196 593		
EFP47. Increasing the productivity of dual-purpose cattle in Nicaragua through use of	ILRI		Work at Camoapa, Matiguás. Assesment of constraints and research gaps, identification of cattle breed-types that		123 946 (up to 2017)		

appropriate breed types and application of best husbandry practices			best match smallholder production systems, building capacity on cattle breeding			
SLC25. Plan de Implementación – Acompañamiento del CIAT al Programa de Gestión Rural Empresarial, Sanidad y Ambiente (PROGRESA)	CRS	M. Lundy, R. Van der Hoek	Work at Matagalpa, Nueva Segovia, Estelí, Jinotega on dry season forage options and dairy processing – managed by CRS.		60,0000	
SLG15. Carbon insetting in dairy value chains – BMZ Small Grant [CCAFS project]	BMZ	P. Laderach, R. van der Hoek	Work at Matiguás, Camoapa. Various activities towards assessing the socio-economic potential of carbon efficient livestock practices for smallholders and the private sector			60 000 (to Jan 2016) Note this is a CCAFS project
EFU37A . Sustainable grassland intensification through ecosystem services and improved grazing management strategies	USAID	R. van der Hoek			173 900	

Figure 5: Nicaragua reporting structure



Note: obligatory vs courtesy reporting is defined by budget holding. The principal investigator for a project, who holds the budget, is obliged to report to L&F management and the donor but not obliged to report to the L&F Nicaragua team leader.

F5: Viet Nam research hub

Written by Anni McLeod. Based on the visit report by Anni McLeod and Julie Fitzpatrick. 2 October 2015

1. Overview of the programme

Development context

Pigs are the predominant livestock in Viet Nam from the supply and demand perspectives. Pig meat is important in the Vietnamese diet. Domestic production has grown annually for at least the last 20 years, mostly to supply domestic demand. For a brief period in the 1990s Viet Nam reportedly exported 60 000–75 000 tonnes per year; more recently it has exported approximately 10 000 tonnes per year (FAOSTAT). There continues to be a strong demand for fresh pork, bought from local markets. In 2006, 84 percent of pig producers were smallholders with 1–5 sows. Recent macro-economic modelling done by IPSARD and described in a presentation made to the evaluation team suggests that smallholder production will continue to be important for at least the next ten years, and that output from value chains supplied by smallholders will increase in volume.

MARD policies acknowledge smallholder pig production to be important. LIFSAP, funded by the World Bank[12] and implemented by MARD, supports investment in pig value chains supplied by smallholders.

L&F approach and programme portfolio

The CG in L&F Viet Nam is represented by ILRI (based in Viet Nam) and CIAT (working from the Lao People's Democratic Republic).

The long-term aim of L&F's work in Viet Nam is encapsulated by the motto "healthy pigs, increased production and happy people".

The programme has combined a strong legacy of work on pig sector policy and marketing with new research avenues. In the field it has focused on identifying project sites and defining issues on which to work. It has built on ILRI's legacy of work on smallholder pig producer competitiveness by:

- combining new scoping studies with previous published research to build a comprehensive picture of trends and issues;
- maintaining a very small portfolio of policy research that supports L&F objectives, notably the updating and expansion of the Viet Nam Pig Sector model;
- maintaining and strengthening links within the Vietnamese research community;

[12] http://documents.worldbank.org/curated/en/2009/07/10823712/vietnam-livestock-competitiveness-food-safety-project

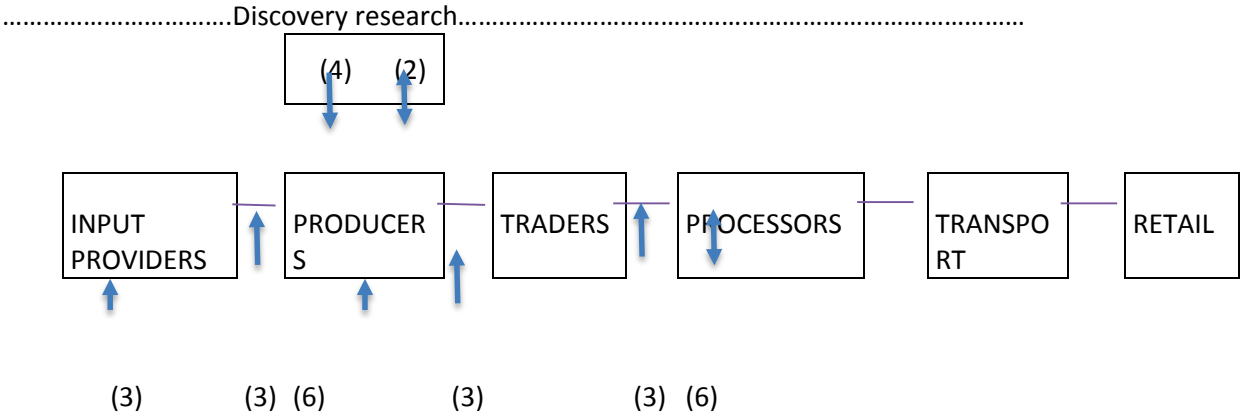
- maintaining and strengthening relationships with MARD in Hanoi and the provincial and district departments of agriculture and rural development in target provinces.

In addition, L&F has worked with A4NH to bring in bilateral funding to work on food safety in pig value chains (the PigRisk project).

Two clusters of sites have been selected, one in the north and one in the south of the country. Each cluster contains 4–5 provinces. The reasons for selecting clusters rather than individual provinces as research sites are that the provinces are quite small in area and well connected by road, and most pig value chains span more than one province. The southern cluster serves local markets and Ho Chi Minh City, while the northern cluster serves local markets and Hanoi. From time to time pigs from the south may be sent to the north, and vice versa, to take advantage of price differences between Ho Chi Minh City and Hanoi. However this appears to represent opportunistic behaviour by large-scale traders rather than an established value chain.

The programme strategy appears to be developing in certain directions in each cluster of sites, but it is not yet clear where the focus lies. Two distinct value chains are being investigated, one involving indigenous pigs and the other using crossbred pigs to produce leaner meat. These points are discussed further in sections 2 and 3.

The work of L&F along the value chain is summarized in the diagram below. It works from production to processing and on policy. The linked A4NH PigRisk project will add a consumer focus.



Discovery projects have contributed tools, assistance with baseline surveys (F&F) and strategic thinking (Animal Genetics), although inputs have been fairly light.

Discovery research activities and funding sources:

- Animal Genetics – visit by Karen Marshall/Max Rothschild to discuss potential for work on pig genetics (1);

- F&F household survey in Dak Lak by ILRI Viet Nam and CIAT Lao People's Democratic Republic (Adrian Bolliger and Tassilo Tieman) of 320 pig-growing households, intended to produce a proposal for bilateral funding (1);
- F&F money promised for feed and fodder quality analysis and phenotyping (not yet used) (1);
- SASI – time allocated for technical input on incorporating gender issues into studies (not yet provided) (2).

Value chain research activities (see also section 2):

- future work possible on feed quality (3);
- linking indigenous pig producers to markets (3);
- policy context: updating and expansion of the pig sector model using W1/2 funding (4);
- value chain assessments using W1/2 funding (also done in Dong Nai, which is not an L&F site, through the REVALTER project) (5);
- PigRisk (A4NH) – contribution to value chain assessment and baseline information on animal health (6).

The majority of funding is from bilateral projects. Section 2 provides a breakdown.

The team has developed commendably strong links with local research partners and they are building good links with development partners (government agencies) through joint activities and sharing of information.

Local research partners are:

- CAP;
- IPSARD;
- Hanoi School of Public Health (works with A4NH on the PigRisk project);
- RUDEC (for the REVALTER project, not strictly L&F but working on related subjects);
- TNU;
- VNUA.

Local development partners are:

- DARD (in provinces where L&F works);
- government extension agents (at communes where L&F works).

Other important local stakeholders include:

- MARD in Hanoi, including the Department of Livestock Production and the Department of Veterinary Services;
- ACIAR (an important provider of bilateral funding to ILRI, including the PigRisk project).

The only current international partner is:

- CIRAD (manages the REVALTER project)

2. Highlights

Established and working well

- It is relevant for L&F to work on pig value chains. Demand for pork continues to grow in Viet Nam, and recent modelling of the pig sector (by CAP-IPSARD, supported by L&F W1/2 funding) indicates that smallholders will continue to play an important role for the next ten years or more.
- The programme has an appealing goal. A stakeholder alliance meeting has been held and the vision of "healthy pigs, increased production and happy people" was created.
- L&F has made good use of relationships established through previous ILRI work to build strong partnerships within the Vietnamese research community (particularly IPSARD, TNU and VNUA).
- L&F is well embedded within the policy and development institutional framework in Viet Nam, through relationships with MARD, DARD and local extension offices. These relationships make it possible for field research to be carried out, and increase the likelihood that research findings will be translated into changes in practice and policy.
- MARD and DARD acknowledge the role of smallholder pig producers. This is a change compared to their previous strategy, and has been influenced by ILRI policy briefs from legacy work and continued advocacy during L&F.
- The programme in Viet Nam makes good use of legacy work, particularly work done on the competitiveness of smallholder pig production and the development of the Viet Nam pig sector model. This model was developed using previous ACIAR funding and has been updated and expanded with W1/2 funding.
- The programme's two geographical areas are well chosen, representing the diversity of pig value chains and posing different research and development challenges.
- The presentations made to the evaluation team were, without exception, of high quality and value. The speakers included L&F staff and individuals from multiple partnership organizations relevant to the programme. National partners who accompanied the team on field visits were confident in describing sampling strategies and obviously experienced in interacting with famers. The ILRI value chain leader works closely with national research partners on research design, analysis and published outputs.
- The ILRI project team in Viet Nam, although too small for the work required, is well qualified and highly committed. The team leader is very well acquainted with the Vietnamese pig sector and respected by key stakeholders.

Emerging and interesting

- L&F is building a promising relationship with LIFSAP. This is a development project funded by the World Bank and implemented through MARD that supports upgrading of slaughterhouses and investment in good practice (GAHP) in pig raising. It is proposed that L&F will do a study of the uptake of the Viet-GAHP system and this may lead to opportunities for more comprehensive assessments of the impact of Viet-GAHP and the potential for

outscaling. This is a very positive development in that DARD has acknowledged the value of researchers providing an objective assessment of the system.

- There is the possibility of linking market opportunities for indigenous pig producers to conservation of genetic diversity. This is a very new idea that needs thorough exploration and has not yet been clearly articulated in the project documents. It is interesting because potentially it could achieve two development outcomes and because the Animal Genetics flagship has been the most proactive of the discovery flagships in interacting with the Viet Nam value chain.
- It has been possible to establish the A4NH PigRisk project on food safety in Viet Nam because L&F is already well embedded in the Vietnamese system. This is a good example of synergy between CRPs.

Constraints/vulnerabilities/gaps

- Our greatest concern is that the programme strategy appears to be reactive rather than proactive. The list of priorities to 2017 do not add up to a clear strategy – they need focus. The programme needs a proactive strategy that focuses on clear areas of need and plays to core competences, combined with a business model and clearly linked to development outcomes. The evaluation team provided ideas on an approach to strategic planning.
- Lack of attention by discovery flagships is an additional concern – the only visit to discuss programme content has been from Animal Genetics (by Karen Marshall, who can address some but not all of the important issues). There are clearly important gender issues but no one from Nairobi has yet made time to visit, in spite of requests to do so.
- The L&F team appears to be focusing very strongly on PigRisk – perhaps because it is the newest and largest bilaterally funded project. However it is an A4NH project and not core L&F business. In addition, while food safety is clearly an emerging issue in Viet Nam it is not well understood by the value chain stakeholders with whom ILRI works – for example, none of them can quote relevant statistics on human infection. In our opinion this project is a useful sideline for L&F (as opposed to A4NH) engagement and brings needed expertise to the ILRI team in Viet Nam, but should not engage too much of L&F's time.
- L&F lacks visibility as a programme. The wiki does not help. We suggest reviving the VietPig website and turning it into a "one stop shop". It is not important for the "L&F" name to be known, but a name used to symbolize L&F in Viet Nam should be known and widely quoted.
- The published outputs we have seen have been good – but we expected to see more of them. L&F has unanalysed and unpublished data that may yield very interesting outputs. A clear strategy that allocates staff time for the production of high quality, peer-reviewed publications should be incorporated into the project in future.
- The team is caught in a vicious circle: because it is small, there is limited time for strategy and fundraising – as a result there is limited operational funding and therefore no opportunity for increasing the size of the team. A manager is needed to take care of day-to-day supervision so that the value chain leader can concentrate on advocacy, fundraising and quality of science.

Additional comments

- TOC does not appear to be much used/considered in this value chain programme. Impact pathways are often referred to, but the TOC is not, and we were told that the concept is not well understood by partners.
- Individual livestock value chain programmes are "price takers" and compete with each other for attention from discovery flagships. They may be stronger if they become a "cooperative" and put joint, prioritized suggestions/requests to discovery flagships (e.g. a list of useful diagnostics tests that covers the full range of needs across nine value chains to the Animal Health flagship).

3. Findings against evaluation questions

This section expands on and adds to the highlights presented in section 2.

1. Is the maxim "more meat, milk & fish – by & for the poor" credible and realistic?

Not addressed during this visit.

2. CRP Flagship coherence: is there a valid, demonstrable and logical contribution of the discovery flagships to the broader value chain-centred delivery flagship, and vice versa?

L&F in Viet Nam uses adapted versions of tools developed by SASI for value chain assessment in Africa. However these tools were developed for Africa, are not always appropriate for the situation in Southeast Asia and the discovery researcher has made no attempt to address this problem, instead leaving it up to the value chain team. The gender team based in Nairobi, which has been very proactive in other value chains, has not visited Viet Nam (but expects to do so later this year). There is no evidence that discovery flagship content has been or is being influenced by the results of scoping studies done in Viet Nam.

3. Does L&F have sufficient capacity (in all senses) to deliver on the promise of a value chain approach to enhancing the roles of livestock and fish?

It does not! Resources are scattered too thinly and there is too little coordination within the VCTS flagship.

It became apparent during this visit that individual livestock value chain programmes are "price takers" and compete with each other for attention from discovery flagships. They might become stronger if they operated as a "cooperative" and put joint, prioritized suggestions/requests to discovery flagships (e.g. a list of useful diagnostics tests that covers the full range of needs across nine value chains to the Animal Health flagship).

4. What has been the added value (if any) of integrating previous livestock and fish research programmes into the CRP?

The programme in Viet Nam makes good use of legacy work, particularly work done on competitiveness of smallholder pig production and the development of the Viet Nam pig sector model. The pig model was developed using previous ACIAR funding and has been updated and expanded with W1/2 funding.

5. Does L&F have the appropriate partners for research on value chains, and is it using the right partnership models and principles?

There are strong local research partners who presented some of their results to the evaluation team (VNUA, RUDEC) and had a lively discussion. The approach taken (working together and mentoring, over a long period) seems to be paying off.

The approach to partnering with MARD – through consistent delivery of useful policy information – and DARD – through a slow process of building trust through collaboration in the field – also seems to be working. However, experience suggests that sustainability will rely on key people remaining in specific positions.

The programme has not built strong links with the VWU, which might have been a valuable partner for gender mainstreaming. We received the impression that the VWU is very busy, as it is approached by everyone wishing to work on gender issues or with women.

6. How is gender explicitly integrated into the CRP to enhance impact?

See below under Gender.

7. To what extent has L&F leveraged capacity across the CGIAR centres?

An A4NH project, PigRisk, has been initiated to look at food safety in pig value chains. It was possible to establish the project because L&F is already well embedded in the Vietnamese system. In return, A4NH has provided animal health expertise that was previously not available within the ILRI team in Viet Nam. This is a good example of synergy between CRPs.

9. How well has L&F delivered to date against planned outputs?

The programme is making reasonably good progress in the areas in which it works but has a backlog of data to be analysed.

10. To what extent do governance and management arrangements in L&F help it to reach its SLOs and IDOs?

Not much! See below under Organizational performance.

11. Does L&F adequately cover poultry research (given the documented demand, nutritional value and opportunities offered by poultry)?

L&F in Viet Nam does no poultry research.

12. Does L&F adequately cover NRM and environmental issues associated with livestock and fish that are not captured within other CRPs?

Lower environmental pollution from pigs is one of the objectives the L&F programme in Viet Nam. There is currently no bilateral funding for research on environmental issues and we did not see or hear of any such research. L&F is building a relationship with the World Bank-funded LIFSAP, which promotes the use of biodigesters by farmers – with mixed results to date.

13. Does L&F adequately cover post-harvest opportunities for value addition and loss avoidance that are not captured by livestock and fish research in other CRPs?

L&F is not currently researching post-harvest opportunities. It is focusing on increasing the value of pigs sold and the reliability of markets for pigs. It has partnered with LIFSAP (see below under Effectiveness/efficiency), which has upgraded slaughterhouses and pig meat markets, and the PigRisk project under A4NH, which is working on food safety in pig value chains.

Relevance

It is relevant for L&F to work on pig value chains. Demand for pork continues to grow in Viet Nam. Current data show high demand and a strong presence of smallholders in the domestic market (plus seasonal "grey" export). Recent modelling of the pig sector (by CAP-IPSARD, supported by L&F W1/2 funding) indicates that smallholders will continue to play an important role for the next ten years or more. Work with policy researchers and those who influence policy is highly relevant as it provides useful data and will assist in keeping smallholder considerations on the policy agenda. MARD and DARD now acknowledge the role of smallholder pig producers. This is a change compared to their previous strategy, which has been influenced by ILRI policy briefs from legacy work and continued advocacy during L&F.

The programme's two geographical areas are well chosen, representing the diversity of pig value chains and posing different research and development challenges. It is not yet clear which of three or four possible value chain types the project will focus on or precisely what it might do in each one. Useful ideas are emerging but they need to be turned into concrete funding proposals.

One possible candidate for this is the linking of market opportunities for indigenous pig producers to the conservation of genetic diversity. This is a very new idea that needs thorough exploration and has not yet been clearly articulated in project documents. It is interesting because potentially it could achieve two development outcomes and because the Animal Genetics flagship has been the most proactive of all of the discovery flagships in interacting with the Viet Nam value chain.

Livestock (especially pigs) and aquaculture (including shrimp for export) are both important to Viet Nam's agricultural GDP and smallholder livelihoods. Presumably there is potential for a research programme that integrates both. However this does not appear to be have been considered by L&F. The single-country, single-species approach adopted by L&F may have discouraged exploration of joint activities. We have also learned from ILRI in Nairobi that the collaborative relationship with WF was slow to develop.

Quality of science

The presentations made to the evaluation team were, without exception, of high quality and value. The speakers included L&F staff and individuals from multiple partnership organizations relevant to the programme. The skills and experience of the individuals in charge and /or presenting information were considered to be of very high quality. National partners who accompanied the team on field visits were confident in describing sampling strategies and obviously experienced in interacting with famers, The ILRI value chain leader works closely with national research partners on research design, analysis and published outputs. The programme has published little but has produced concrete outputs in agricultural economics through contributions to the development of national models and updating of databases on the pig sector. Field studies reported during the visit were based on sound designs and generating results that can be expected to yield publications. Work on food safety,

carried out in collaboration with A4NH, is at an early stage with no published outputs to date. The quality of research results provided during presentations and discussions of food safety at field visits was considered to be high overall.

Effectiveness and efficiency

The programme has an appealing goal. A stakeholder alliance meeting has been held and the vision of "healthy pigs, increased production and happy people" was created. It could be a "brand" for the programme but perhaps has not been sufficiently exploited.

L&F has made good use of relationships established through previous ILRI work to build strong partnerships within the Vietnamese research community (particularly IPSARD, TNU and VNUA). It is well embedded in national agricultural research systems.

L&F is also well embedded within the policy and development institutional framework in Viet Nam, through relationships with MARD, DARD and local extension offices. These relationships make it possible for field research to be carried out and increase the likelihood that research findings will be translated into changes in practice and policy. Engagement with development partners takes a very different form in Viet Nam compared to other value chain sites because government administration and extension systems are extensive at field level and there are few NGOs operating. L&F works with district DARD and extension offices and commune administration and livestock workers. Engaging with these partners to create change on the ground is a slow process.

The links with LIFSAP seem promising. This is a development project, funded by the World Bank and implemented through MARD, that supports upgrading of slaughterhouses and investment in good practice (GAHP) in pig raising. It is proposed that L&F will do a study of the uptake of the Viet-GAHP system and this may lead to opportunities for more comprehensive assessments of the impact of Viet-GAHP and the potential for outscaling. This is a very positive development in that DARD has acknowledged the value of researchers providing an objective assessment of the programme.

The ILRI project team in Viet Nam is well qualified and highly committed. The team leader is very well acquainted with the Vietnamese pig sector and respected by key stakeholders. However the small size of the team is a concern. It is below capacity in terms of staff numbers and skill sets even though the team has recently been enlarged. It is uncertain how it will acquire all of the necessary skills to address the range of questions emerging from value chain assessments. The team is caught in a vicious circle: because it is small, there is limited time for strategy and fundraising – as a result there is limited operational funding and therefore no opportunity for increasing the size of the team. A manager is needed to take care of day-to-day supervision so that the value chain leader can concentrate on advocacy, fundraising and quality of science.

Funding is also limited, for example, research into feed & forage, genetics, and management/agri-business have received only USD 100 000 per year of W1/2 funding and no substantial bilateral funding.

Our greatest concern is that the programme strategy appears to be reactive rather than proactive. The list of priorities to 2017 do not add up to a clear strategy – they need focus. The programme needs a proactive strategy that focuses on clear areas of need and plays to core competences, combined with a business model and clearly linked to development outcomes.

Lack of attention by discovery flagships is an additional concern – the only visit to discuss programme content has been from Animal Genetics (by Karen Marshall, who can address some but not all of the important issues). There are clearly important gender issues but no one from Nairobi has yet made time to visit, in spite of requests to do so.

The L&F team appears to be focusing very strongly on PigRisk – perhaps because it is the newest and largest bilaterally funded project. However it is an A4NH project and not core L&F business. In addition, while food safety is clearly an emerging issue in Viet Nam it is not well understood by value chain stakeholders with whom ILRI works – for example, none of them can quote relevant statistics on human infection. In our opinion this project is a useful sideline for L&F (as opposed to A4NH) engagement and brings needed expertise to the ILRI team in Viet Nam, but should not engage too much of L&F's time.

L&F lacks visibility as a programme and the wiki does not help. The existing VietPig website is more appealing and could be turned into a "one stop shop".

The published outputs we have seen have been good – but we expected to see more of them. L&F has un-analysed and unpublished data that may yield very interesting outputs. A clear strategy that allocates staff time for the production of high quality, peer-reviewed, publications should be incorporated into the project in future.

TOC does not appear to be much used/considered in this value chain programme. Impact pathways are often referred to, but TOC is not, and we were told that the concept is not well understood by partners.

Impact and sustainability

The programme is having impact from legacy research continued/developed in L&F. It is trying to build sustainability through partnerships in research and with government agencies – this strategy looks promising. It is too soon to assess the potential impact of new areas of work. The growing engagement with LIFSAP seems promising for outscaling of research results.

Partnerships

L&F has built strong partnerships with national partners in economics (e.g. IPSARD, VNUA), food safety (Hanoi School of Public Health) and animal genetics (VNUA, NIAS). It also has a growing partnership with MARD and DARD.

The partnership model that is being employed with research partners is one of collaboration and mentoring within research projects that L&F funds. When working with the government agencies, the agencies provide access and local contacts while L&F brings research capability and funding for research activities. It has taken time, effort and shared experience to build all of the existing partnerships. It is evident that key individuals within all of L&F's partners respect the professional expertise of the team leader, who has built a solid reputation over several years for carrying out research in Viet Nam.

L&F is also promoting partnerships between national research partners and government agencies by supporting research that these agencies consider to be useful and providing the means to carry out projects in which both can be involved. L&F is certainly not the only initiative that has done this – projects funded by the World Bank, FAO and various donor agencies have also encouraged

Vietnamese stakeholders to work together – but L&F emphasizes the involvement of the national universities in a way that many other projects do not.

The strongest funding partner has been ACIAR, which funded a previous ILRI project on pig markets and now funds the A4NH PigRisk project. A representative from ACIAR attended our first meeting with partners and was clearly well briefed on L&F activities.

Capacity building

Capacity building in agricultural livestock economics has been a part of L&F and ILRI's previous ACIAR-funded projects for several years, through joint activities and mentoring of national scientists. More recently, VNUA and TNU scientists have been mentored while carrying out value chain assessments. The approach seems to have worked well: national scientists who made presentations about L&F work were confident and articulate, and the presentations were generally of high quality. It is less obvious that there has been capacity building in other disciplines.

Gender

Gender questions have been incorporated into value chain assessment surveys. The programme works with women as well as men farmers. Gender is not a strongly visible part of L&F's work, but neither is the programme gender blind. The team in Viet Nam has been in contact with the gender team in ILRI Nairobi and expects a visit later this year.

Organizational performance

The L&F team in Viet Nam faces the same challenges in dealing with reporting and other administrative requirements as other small value chain teams. It is physically housed in ICRAF's building and has benefited to some extent from their assistance with administration.

We sensed some distance between the team here and CRP management – not hostility, but separation. The team seems to have a closer relationship with the ILRI regional office, to whom the L&F team leader reports, through the ILRI management structure. The ILRI regional co-ordinator took the trouble to visit Viet Nam at the time the evaluation team was there and meet us.

4. Additional material

Table 7: Viet Nam programme outputs

Video	ILRI. 2010. Value 'webs' a promising approach for CGIAR Livestock Fish Mega Program. Video. Nairobi (Kenya): ILRI.
Presentation	Lapar, L. 2011. Update on pig value chain development in Vietnam. Presented at the CGIAR Research Program on Livestock and Fish Planning meeting, Nairobi, 27–29 September 2011. Nairobi, Kenya: ILRI.
Report	ILRI, CIAT, ICARDA, WorldFish Center. 2011. Pigmeat value chain in Vietnam: Background proposals for the CGIAR Research Program on Livestock and Fish. Nairobi, Kenya: ILRI.
Presentation	Lapar, L. 2012. Pig value chains in Vietnam. Presented at the Livestock and Fish Vietnam Smallholder Pig Value Chain Team Meeting, Delhi, India, 30 April 2012. Nairobi, Kenya: ILRI.
Presentation	Randolph, T. 2012. Vietnam value chain development planning. Presented at the Vietnam Smallholder Pig Value Chain Team Meeting, Delhi, India, 30 April 2012. Nairobi, Kenya: ILRI.

Presentation	Lapar, L. 2012. Update on pig value chain development in Vietnam. Presented at the CGIAR Research Program on Livestock and Fish Value Chain Development Team Meeting, Nairobi, 5–8 March 2012. Nairobi, Kenya: ILRI.
Presentation	Randolph, T. 2012. What have we learned about smallholder systems? Presented at the inception workshop for the 'Reducing Disease Risks and Improving Food Safety in Smallholder Pig Value Chains in Vietnam' project, Hanoi, 14 August 2012. Nairobi, Kenya: ILRI.
Presentation	Lapar, M.L.A., Nguyen Ngoc Toan, Staal, S., Minot, N., Tisdell, C., Nguyen Ngoc Que & Nguyen Do Anh Tuan. 2012. Smallholder competitiveness: Insights from pig production systems in Vietnam. Presented at the 28th triennial conference of the International Association of Agricultural Economists, Foz do Iguacu, Brazil, 18–24 August 2012. Nairobi, Kenya: ILRI.
Report	ILRI. 2012. Report of the Vietnam smallholder pig value chain development planning meeting of the CGIAR Research Program on Livestock and Fish, New Delhi, India, 30 April - 1 May 2012. Nairobi, Kenya: ILRI.
Conference Paper	Lapar, M.L.A., Nguyen Ngoc Toan, Staal, S., Minot, N., Tisdell, C., Nguyen Ngoc Que & Nguyen Do Anh Tuan. 2012. *Smallholder competitiveness: Insights from household pig production systems in Vietnam*. Selected Paper prepared for presentation at the International Association of Agricultural Economists Triennial Conference, Foz do Iguacu, Brazil 18–24 August, 2012. Nairobi, Kenya: ILRI.
Presentation	Lapar, L. 2013. Transforming pig value chains in Vietnam: Stakeholder consultation workshop on site selection. Presented at the Stakeholder Consultation Workshop, Hanoi, Vietnam, 22 March 2013. Nairobi, Kenya: ILRI.
Poster	Lapar, M.L. 2013. Vietpigs: Transforming pig value chains in Vietnam. Poster prepared for the ILRI APM 2013, Addis Ababa, 15–17 May 2013. Nairobi, Kenya: ILRI.
Poster	ILRI. 2013. Transforming smallholder pig value chains in Vietnam. Poster, Nairobi, Kenya: ILRI.
Report	ILRI. 2013. Vietnam smallholder pig and pork value chain development: 2012 Annual Report. Nairobi, Kenya: ILRI.
Presentation	Lapar, M.L. 2013. The state of smallholder-based pig industry in Vietnam: Insights from ILRI's recent research. Presented at the workshop Pathways to Impact: Pig Value Chain Development Potential in Vietnam, Vinh City, Vietnam, 27–28 September 2013. Nairobi, Kenya: ILRI.
Journal Article	Tran, N., Bailey, C., Wilson, N. & Phillips, M. 2013. Governance of global value chains in response to food safety and certification standards: The case of shrimp from Vietnam. *World Development* 45:325-336.
Presentation	Lapar, L. 2014. Livestock and Fish Vietnam smallholder pigs value chain: What has been achieved. Presented at the Smallholder Pigs Value Chain Strategy and Implementation Planning Meeting, Buon Ma Thuot, Dak Lak, Vietnam, 25–26 September 2014. Nairobi, Kenya: ILRI.
Report	Nguyen Thi Duong Nga, Ho Ngoc Ninh, Pham Van Hung & Lapar, M.L. 2014. *Smallholder pig value chain development in Vietnam: Situation analysis and trends*. ILRI Project Report. Nairobi, Kenya: ILRI.
Presentation	Hung Nguyen-Viet, Lapar, L. & Grace, D. 2014. Pork value chain in Vietnam: Now, future and challenges. Presented at a seminar for veterinary students, School of Animal and Veterinary Sciences, Charles Sturt University, Wagga Wagga, Australia, 13 March 2014. Nairobi: ILRI.
Poster	Duong Nam Ha, Nguyen Thi Thu Huyen, Ninh Xuan Trung, Tran Van Long, Nguyen Anh Duc, Vu Khac Xuan, Nguyen Thi Duong Nga, Pham Van Hung, Rich, K.M., Unger, F. & Lapar, L. 2014. Characterizing pig value chains in Vietnam: Descriptive analysis from survey data.

	Poster prepared for Tropentag 2014: Bridging the Gap between Increasing Knowledge and Decreasing Resources Workshop, Prague, Czech Republic, 17–19 September 2014. Hanoi, Vietnam: Vietnam National University of Agriculture.
Report	Lapar, L., Truong Tan Khanh, Pham The Hue, Van Tien Dung & Tran Quang Hanh. 2014. *Scoping study on pig value chains in Dak Lak and Dak Nong, Vietnam*. Nairobi, Kenya: ILRI.
Presentation	Unger, F., Lapar, L., Hung Nguyen-Viet and Grace, D. 2015. Improving livestock value chains: The example of Vietnam (pigs). Presented at the Workshop on Global Health Institute 2015, Chiang Mai, Thailand, 11 February 2015. Nairobi, Kenya: ILRI.

An approximate breakdown of funding since 2012 is summarized in the following table. W3 does not appear anywhere. The team leader in Vietnam did not know the W1/2 funding amounts.

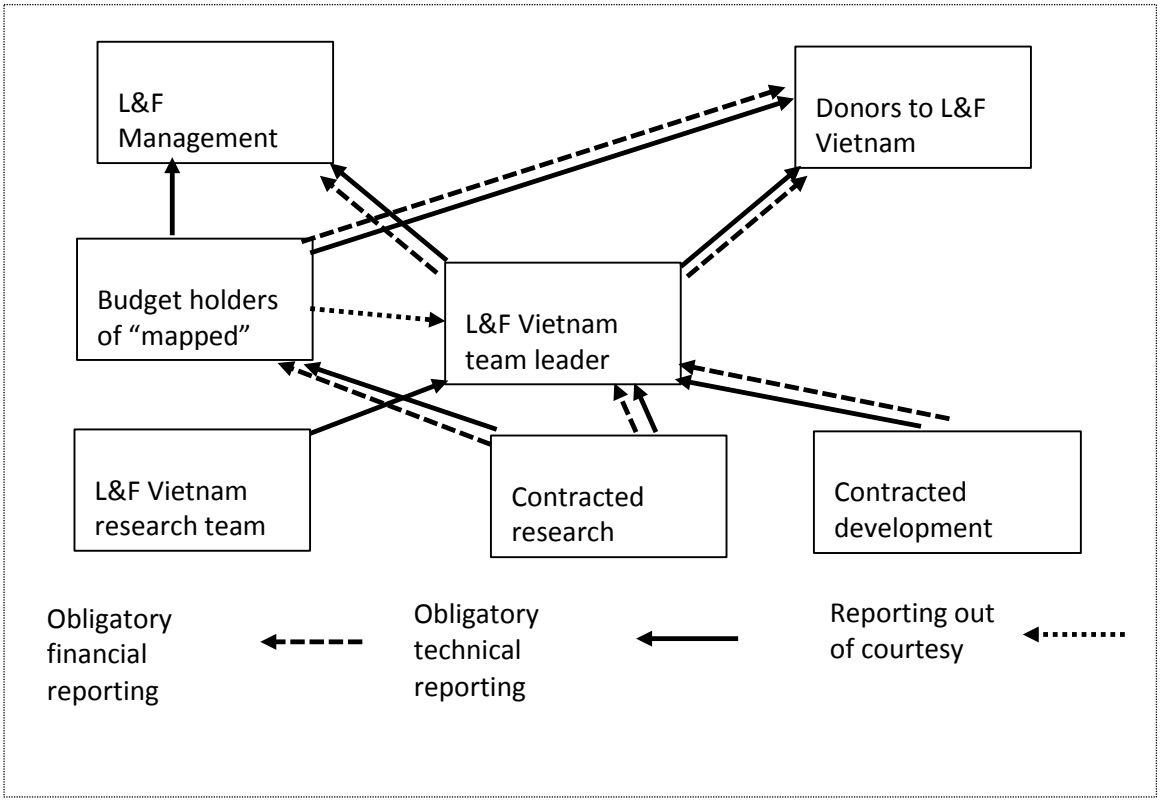
Table 8: Viet Nam bilateral funding sources

Funding sources	Donor	Budget holder	L&F activities funded	Approximate funding			
				2012	2013	2014	2015
Core funding	W1/2		Value chain manager approx. 30% of time annually plus money for travel; part-time researcher since 2015; value chain economist 20% since 2015 Time and seed money for site selection, baseline surveys, value chain assessments User manual for systems dynamics modelling Pig sector model expansion at CAP and updated dataset	xx	xx	xx	xx
L&F discovery to delivery call	L&F		Karen Marshall and Max Rotschild visit			xx	
Cross-CRP projects	L&F		Follow up work on genetics Exploring opportunities for indigenous pig value chain in Central Highlands				90 000
Feed technology and support platform	L&F	Phil Toye	Seed money for lab diagnostics review and pig sector updating	0	xx	0	0
Feed and fodder quality analysis and phenotyping and repository generation	L&F	KVSV Prasad	Promised but not yet used	0	0	0	10 000

Feeds and feed technology review	L&F	Lucy Lapar	Desk study funded by L&F		22 660		
Pig sector model upgrading	L&F	Lucy Lapar	VCTS activity		21 600		
Gender best-bet, delivery	L&F	Alessandra Galie	8% of A. Galie's time, 20% of M. Lodenyi's time, 9% of D. Brandes' time, 8% of senior gender researcher time	0	0	0	xx
PigRisk	ACIAR	Delia Grace	Contributed to site selection, integrated value chain assessment and baseline surveys for production economics operational funding; provided baseline info on animal health to L&F			xx	Xx
REVALTER ("mapped to" L&F)	CIRAD	Isabelle Baltenweck	Information on pig value chain in Dong Nai (south) in return for 10% of L. Lapar time	approx. 50 000			
UNEP		Okeyo & Ibrahim	Flagship activity carried on in Vietnam but not associated with value chain activities and not providing funding to Vietnam value chain	0	0	0	0

Source: Bilateral project list provided by L&F management unit. Values in USD million

Figure 6: Viet Nam reporting structure



Note: obligatory vs courtesy reporting is defined by budget holding. The principal investigator for a project, who holds the budget, is obliged to report to L&F management and the donor but not obliged to report to the L&F Vietnam team leader.

ANNEX G: L&F researcher survey - summary

Overview:

Using SurveyMonkey, an online survey of L&F staff and partners was developed which is based on researcher surveys conducted for previous CRP evaluations. This survey probed around a number of areas and concerns like relevance, quality of science, management, value added of L&F.

The survey includes both, rating and multi plus choice questions as well as open ended questions. Qualitative information provided as response to open ended questions and through comments was analysed separately whereas the quantitative information was analysed using the SurveyMonkey tool.

Process

On 6 July 2015 a first invitation to complete the survey and a link to it were sent to 194 researchers from the four participating centers. Further reminders were sent early September by CRP management, including the CRP Director. By 25 September 2015 when the exercise was closed, a total of 95 individuals had responded.

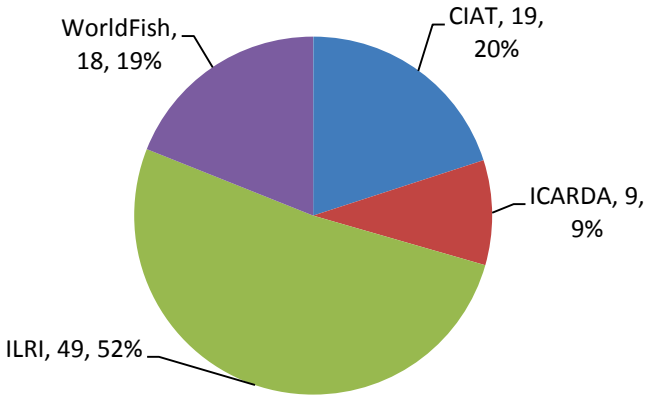
	ILRI	CIAT	WordlFish	ICARDA	TOTAL
Sent to	100	32	53	9	194
Responses	49	19*	18	9	95
Response rate	49%	59%	34%	100%	49%

*: one response indicated he/she worked for both, CIAT and ILRI, and for easier reference is included as CIAT in this analysis

More than half of the respondents were employees of ILRI/L&F. Some other characteristics of the respondents are shown in PART I: INTRODUCTION.

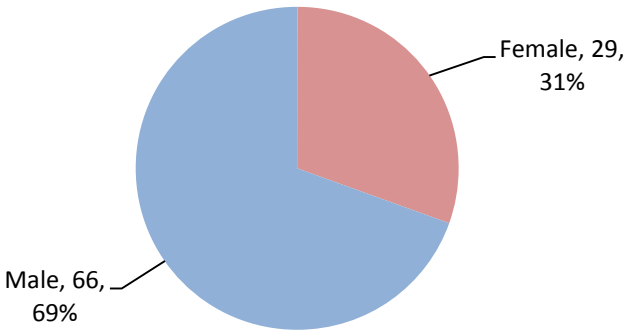
PART I. INTRODUCTION

Figure 7: QUESTION 1: Please indicate your home institution:



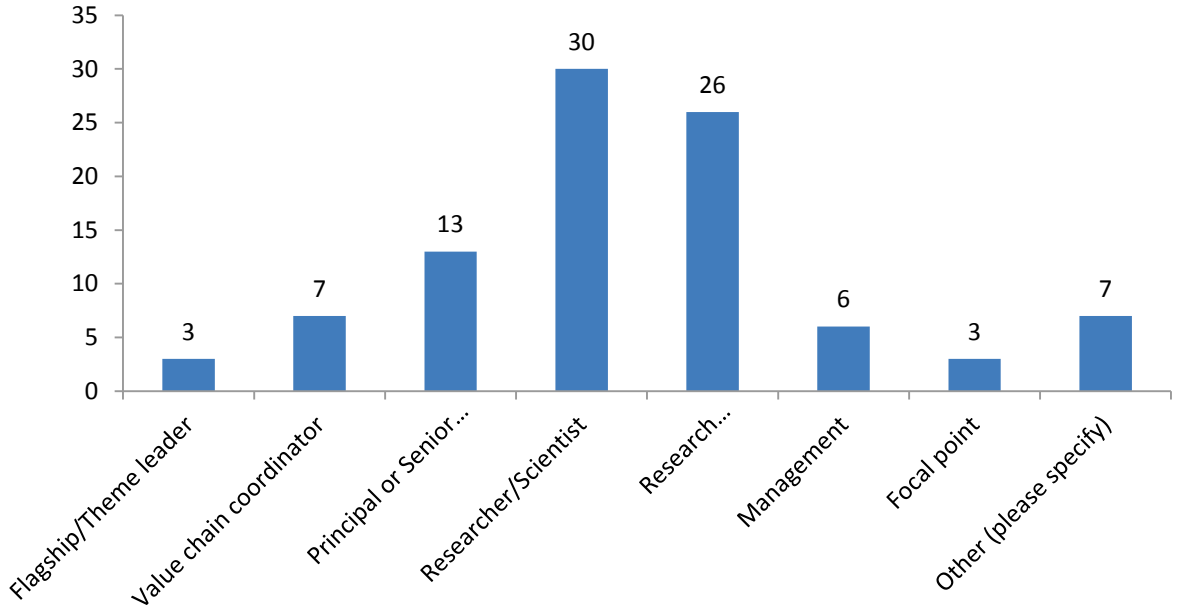
Total responses: 95

Figure 8: QUESTION 2: Please indicate your gender



Total responses: 95

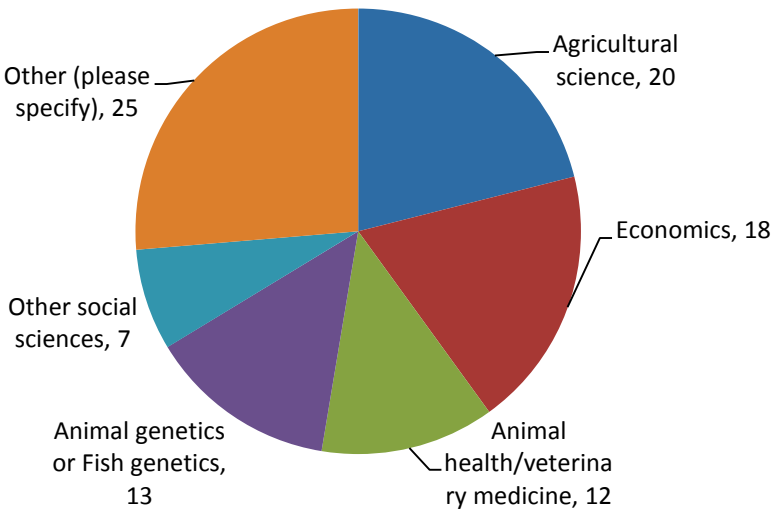
Figure 9: QUESTION 3: What is your role within L&F? If more than one apply, please select the most important one.



Total responses: 95

Other answers: PPMC member, Researcher and Management, both scientist and focal point, Research Support – Methods, Research Officer, Scientist and Program Officer, Capacity Development

Figure 10: QUESTION 4: In what discipline/field is your highest level of academic education?

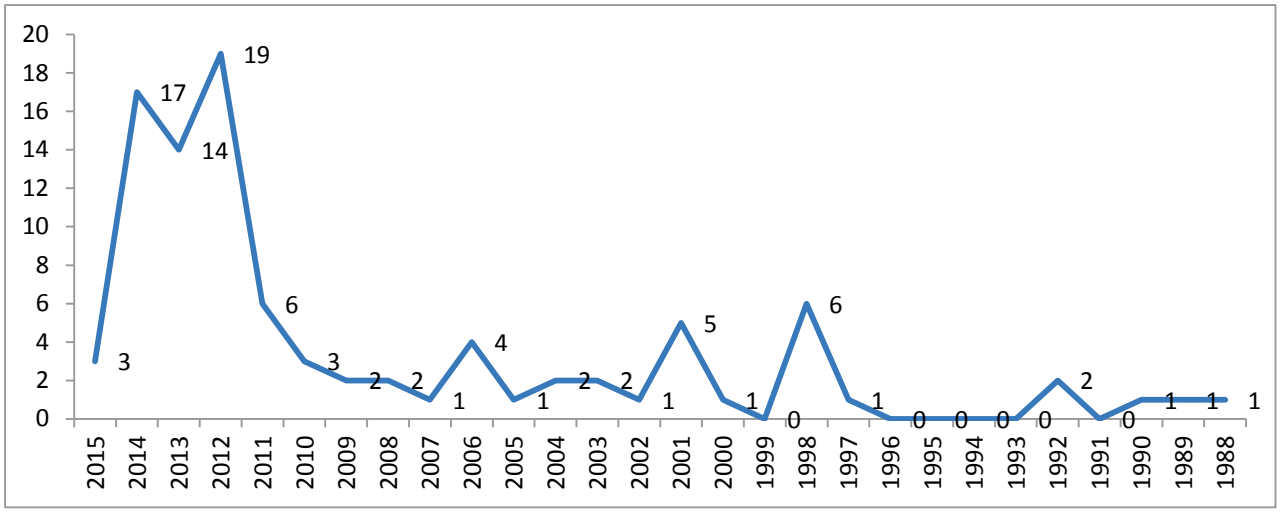


Total responses: 95

Other answers:

Electrical/ Electronics Engineering
Sociology and sustainable agriculture
Environmental issues and natural resources use in agriculture
Bioinformatics
Feeds
Aquaculture science
Animal Nutrition
Environmental sciences
Aquaculture
Chemistry
Forages and animal feeding
Agricultural Economics
animal science
Animal reproduction
Plant genetics, Plant physiology and chemistry
Development Economics and Planning
Applied statistics
Aquaculture
Development Policy and Practice
Immunology
Research Methods
GIS
MICROBIOLOGY
Molecular biology

Figure 11: QUESTION 5: Since when have you been working with your current organization? Please indicate the year you joined



Total responses: 95

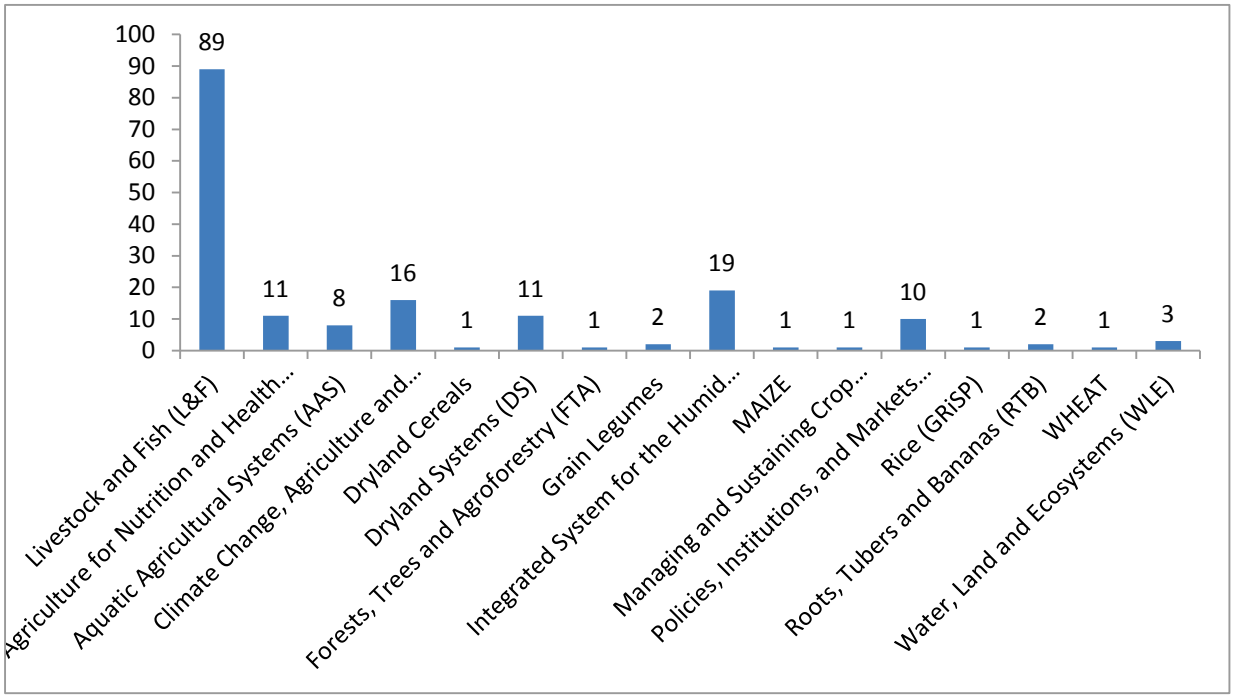
Figure 12: QUESTION 6: In what country are you currently based?

Kenya	32
Colombia	13
Ethiopia	12
Malaysia	9
Egypt	4
Bangladesh	3
Nicaragua	3
Uganda	3
China	2
Jordan	2
Laos	2
Senegal	2
Tanzania	2
Barbados	1
Botswana	1
Costa Rica	1
India	1
Netherlands	1
Vietnam	1

Total responses: 95

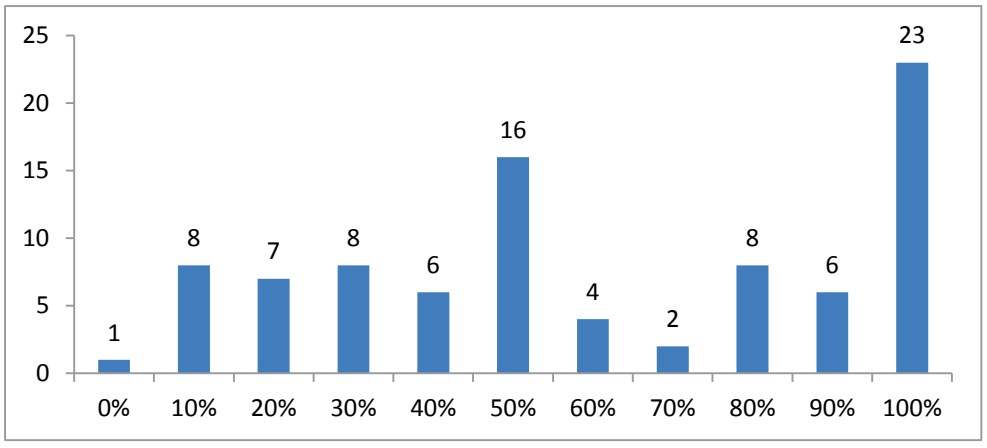
PART II. YOUR INVOLVEMENT IN L&F

Figure 13: QUESTION 7: For which CRP(s) do you currently work? Please estimate the proportion of your total working time spent on each CRP (up to four).. – TOTAL ANSWERS per CRP



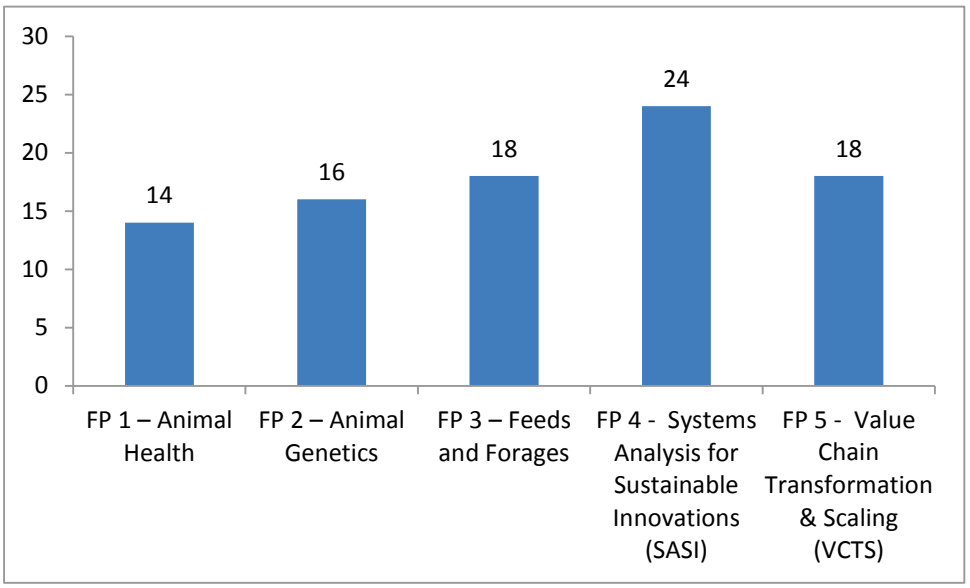
Total responses: 90

Figure 14: QUESTION 7: For which CRP(s) do you currently work? Please estimate the proportion of your total working time spent on each CRP (up to four).. – ANSWERS FOR L&F ONLY



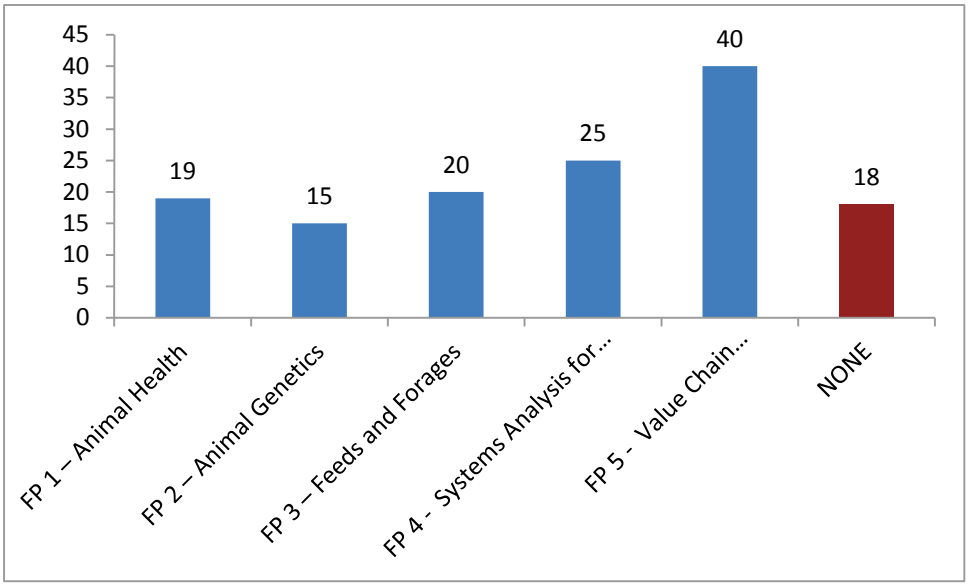
Total responses: 90

Figure 15: QUESTION 8: L&F has been organized around 5 Flagships. To which do most of your own research activities contribute? (Indicate only one.)



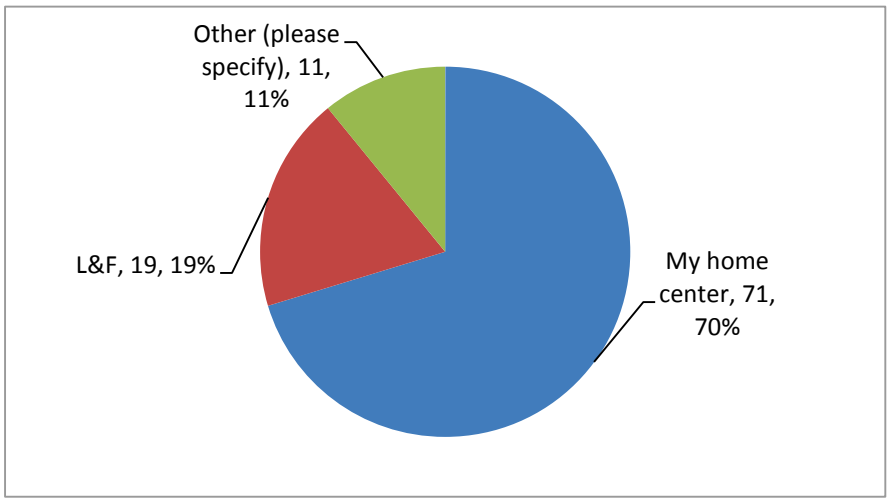
Total responses: 90

Figure 16: QUESTION 9: To which additional Flagships do you also contribute? (Indicate all that apply.)



Total responses: 90

Figure 17: QUESTION 10: Which entity/organization do you primarily identify with?



Total responses: 90

Other answers:

Aquaculture For Income and Nutrition

Livelihoods, Gender and Impact

Livelihoods Gender and impact Unit

I identify with all three, ILRI, L&F and WLE - depending on context

I identify with both to the same extent

ICARDA, Ethiopia Office

Both, should be integrated

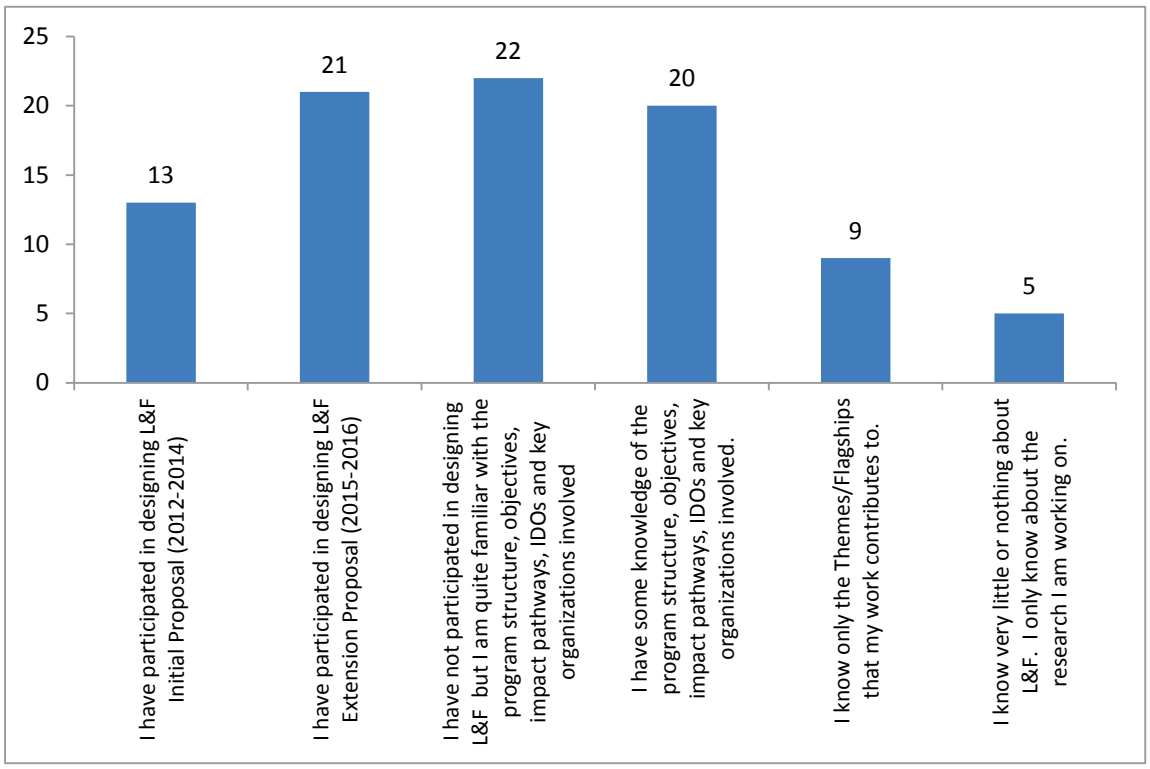
I actually think both

both of them

NO REPLY (only doing this to continue with the tool here as we have a double structure. Representation depends on actual context. And the center supports L&F and vice versa. No straight answer

somehow both

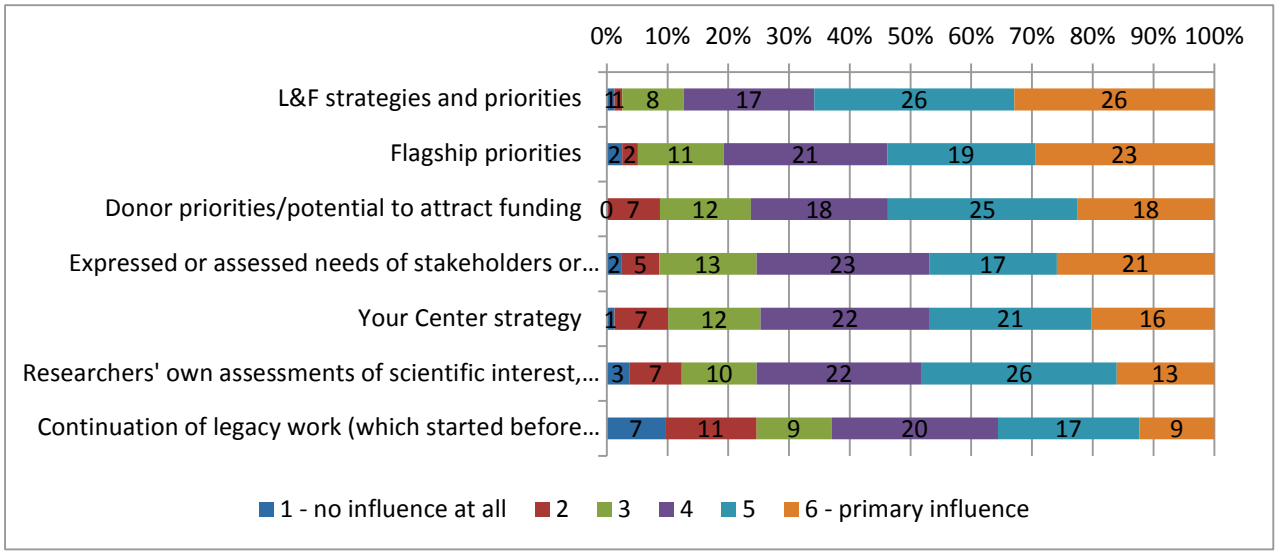
Figure 18: QUESTION 11: How well do you know L&F?



Total responses: 90

PART III. YOUR RESEARCH

Figure 19: QUESTION 12: To what extent do you perceive the following factors to have influenced the choice of research topics in the Flagship to which you mostly contribute? Please score using a scale where 1 = no influence at all and 6=primary influence.



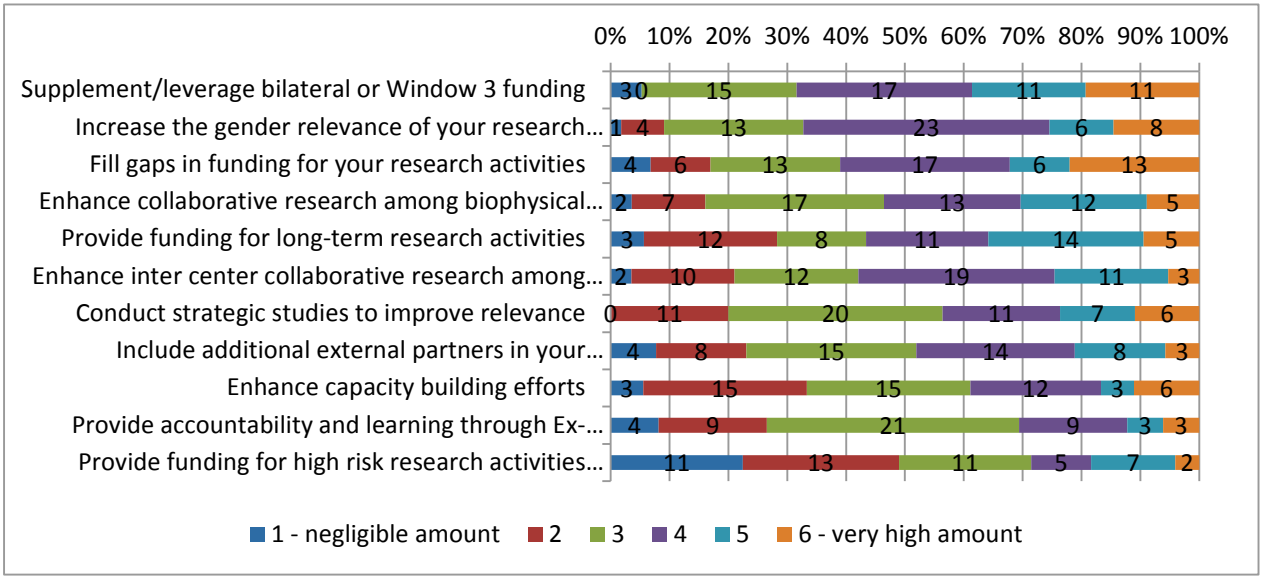
Total responses: 90

QUESTION 13: Are you familiar with the different funding sources of L&F (W1/2 and W3 and bilateral funding) and do you receive funding from W1/2?

- Yes: 64
- No: 23

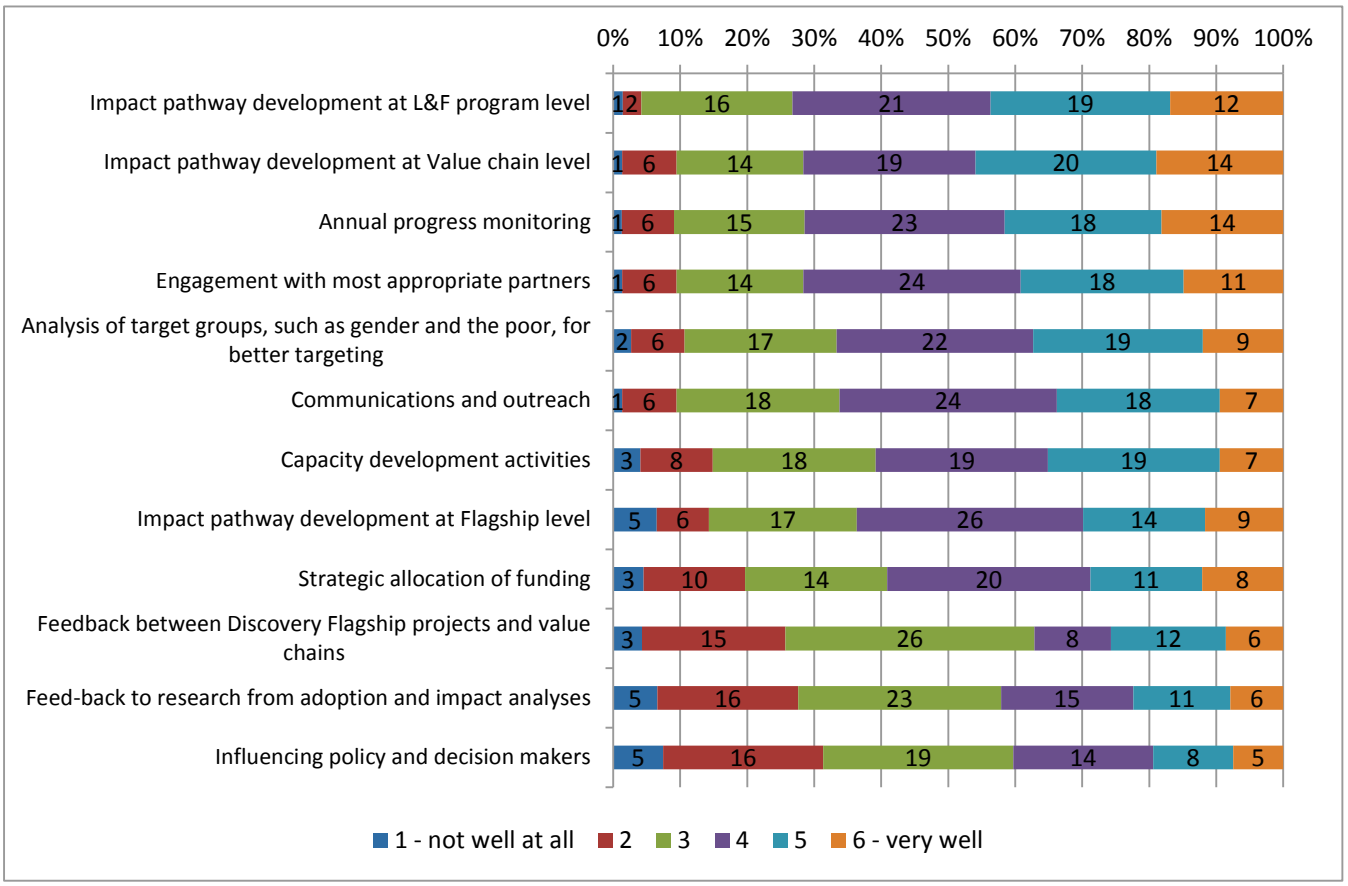
Total responses: 87

Figure 20: QUESTION 14: L&F receives funding from different sources where the Windows 1 and 2 are of least restricted type. What is your view of how W1/2 funds are used in L&F? Please score using a scale where 1 = negligible amount and 6=very high amount.



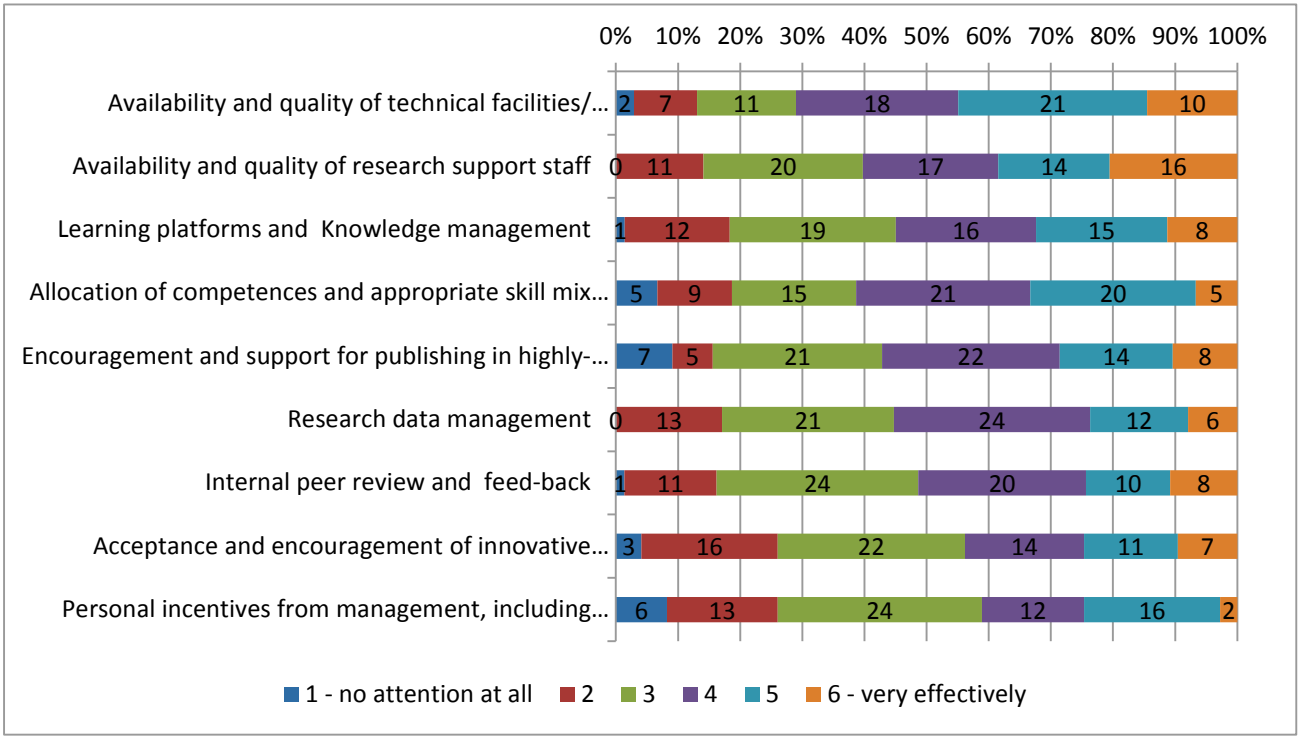
Total responses: 61

Figure 21: QUESTION 15: In your view, how well are the following aspects managed in L&F to ensure that the program reaches its objectives?? Please score using a scale where 1=not well at all and 6=very well.



Total responses: 84

Figure 22: QUESTION 16: In your view, how effectively are the measures listed below managed in L&F for assuring and enhancing high quality of research? Please score using a scale of 6 where 1=no attention at all and 6=very effectively.



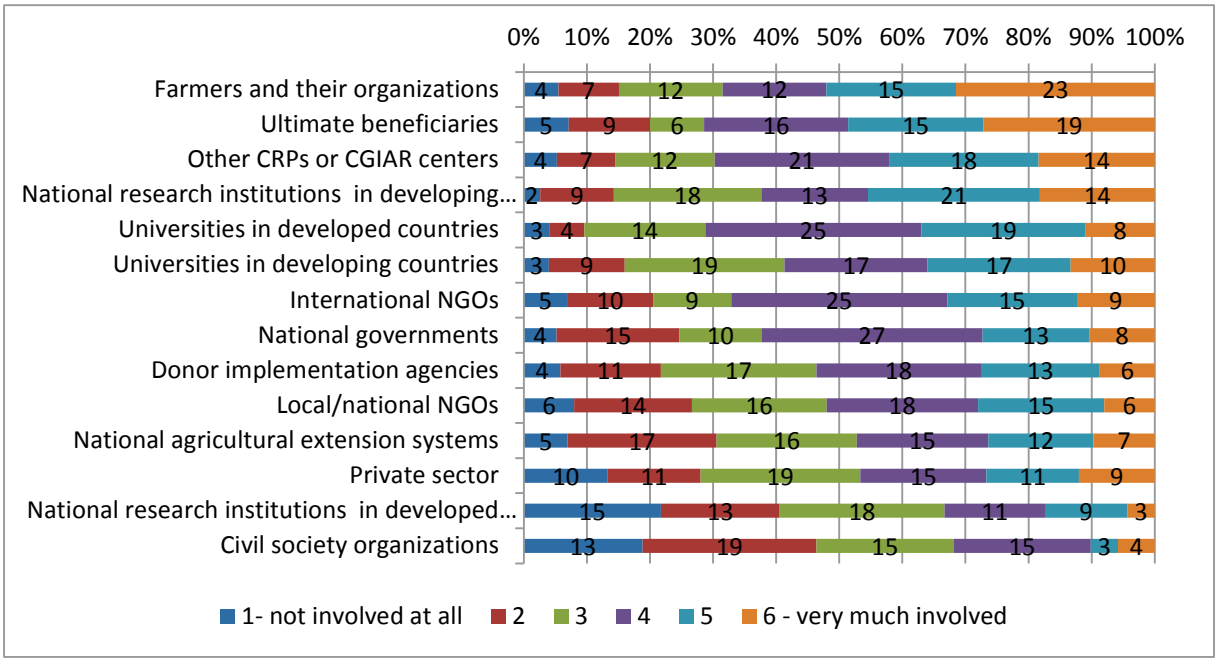
Total responses: 84

QUESTION 17: What would you consider to be the most important incentive applied within L&F (beyond those of your Center) to enhance the quality of scientific research??

- Open ended question

PART IV. PARTNERSHIPS, GENDER AND CAPACITY DEVELOPMENT

Figure 23: QUESTION 18: Please indicate how involved the different partners, as listed below, are for the work you do. Please score using a scale of 6 where 1=not involved at all and 6=very much involved.

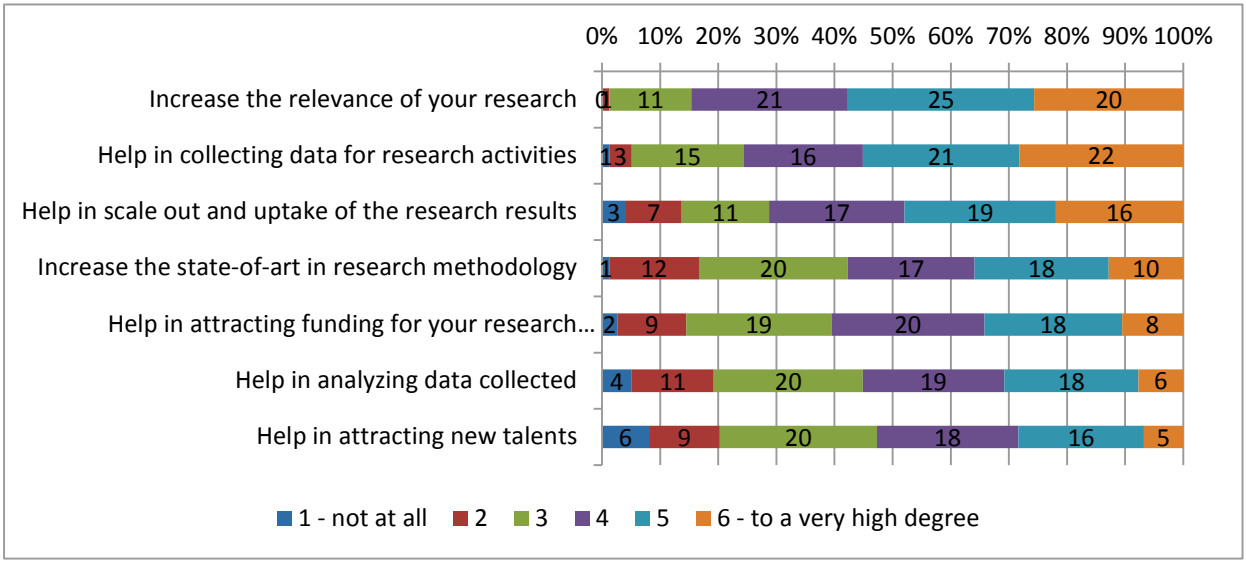


Total responses: 80

Other:

- Carp hatchery owners
- regional research institutions
- the media (both local and international)
- Development Projects

Figure 24: QUESTION 19: To what extent are the key partners in your current research projects enhancing the effectiveness of your research, in the following ways: Please score using a scale of 6 where 1=not at all and 6=to a very high degree

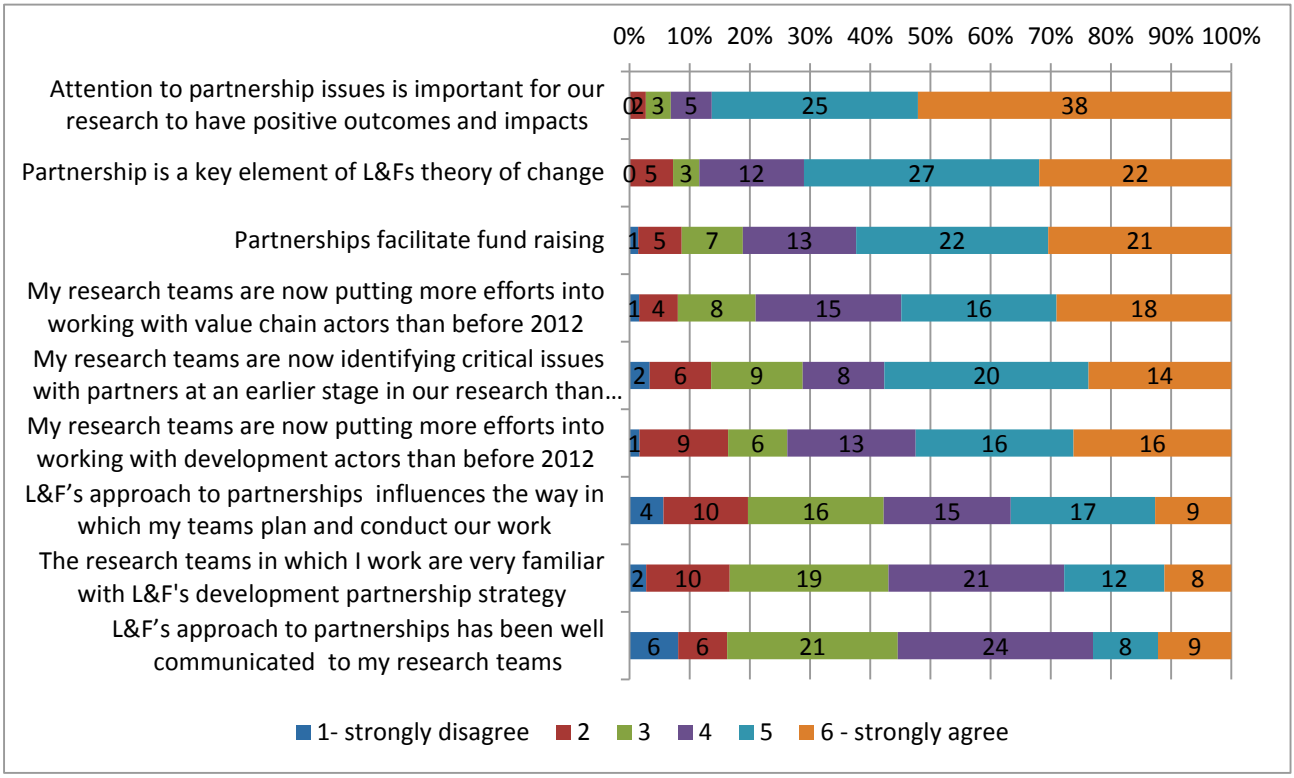


Total responses: 80

QUESTION 20: To what extent do your partnerships add value, in relation to the time and effort involved in managing those partnerships? Please share with us your views, based on your experience within L&F.

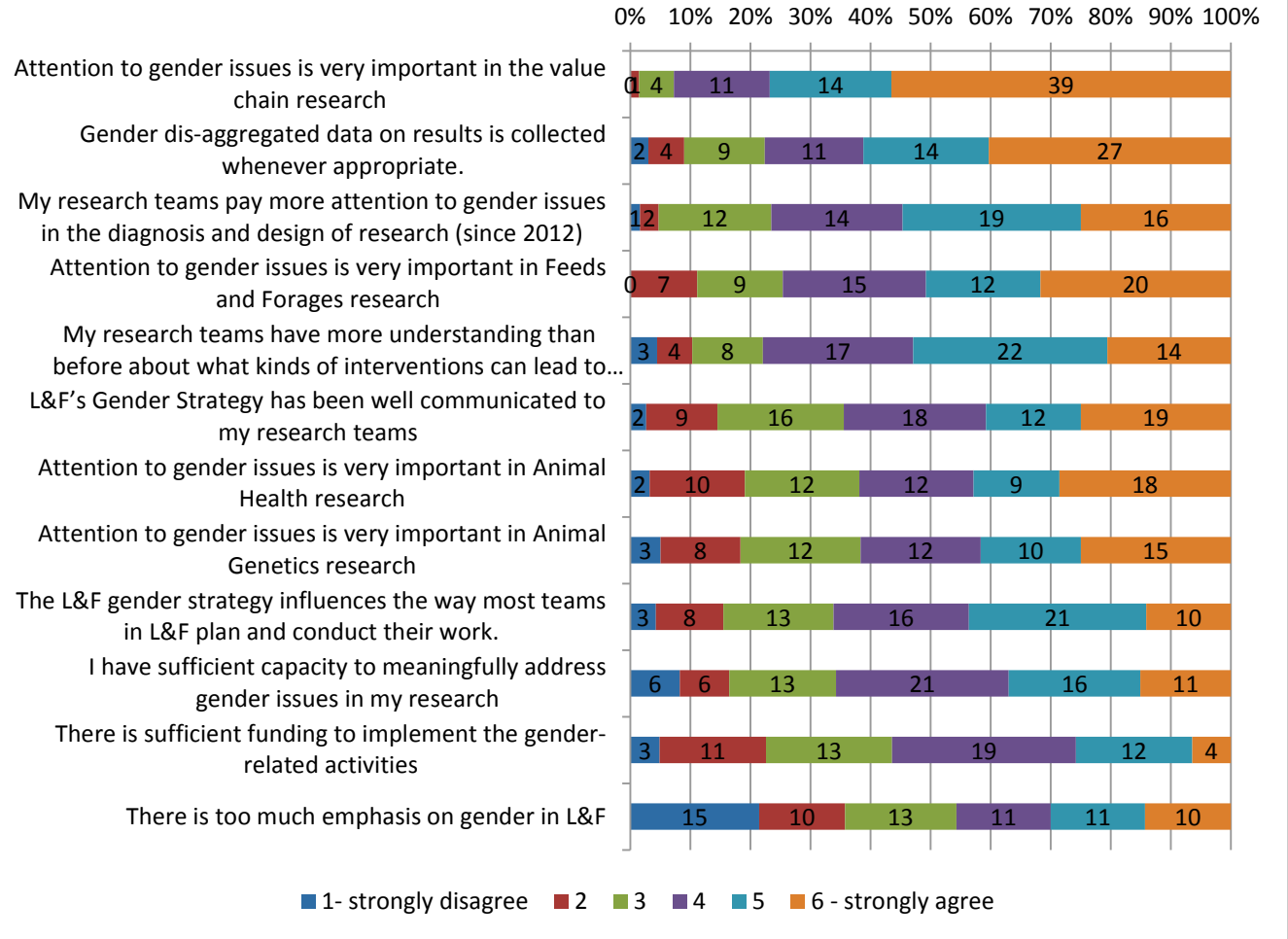
- Open ended question

Figure 25: QUESTION 21: Please indicate your agreement with the following statements that relate to partnerships. Please score using a scale of 6 where 1=strongly disagree and 6=strongly agree



Total responses: 80

Figure 26: QUESTION 22: Please indicate your agreement with the following statements that relate to mainstreaming of gender issues in your work and L&F.. Please indicate your agreement in scale of 6 where 1 = strongly disagree; and 6 = strongly agree

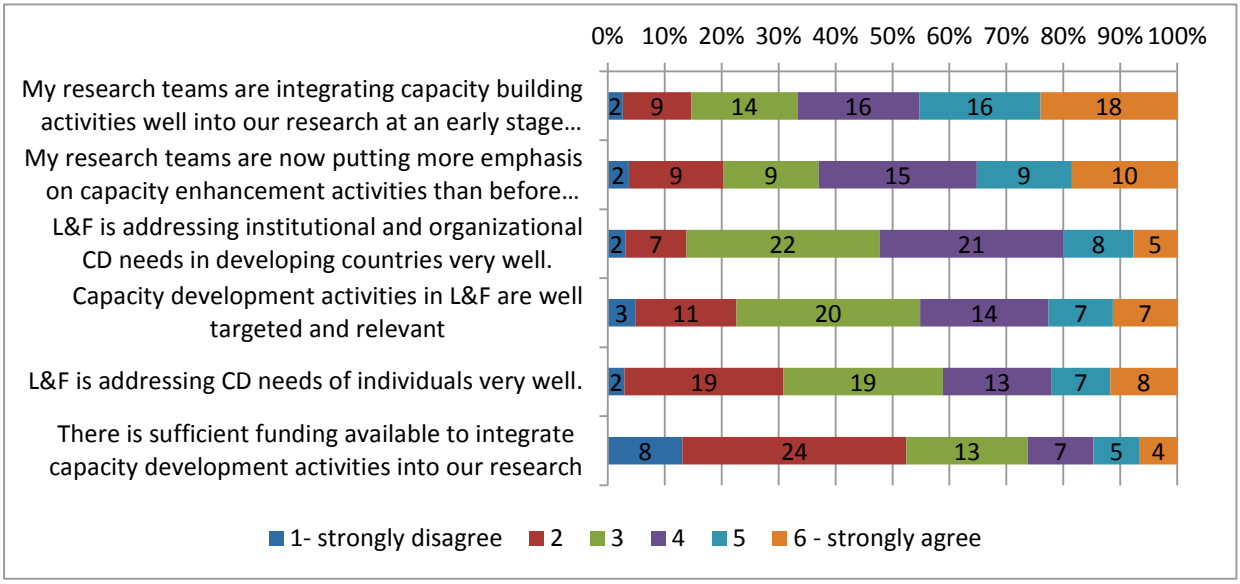


Total responses: 80

QUESTION 23: Please add any comment on gender mainstreaming in L&F and how it has effected your work:

- Open ended question

Figure 27: QUESTION 24: Please indicate your agreement with the following statements that relate to capacity development (CD) in your work and in L&F. Please indicate your agreement in a scale where 1 = strongly disagree; and 6 = strongly agree



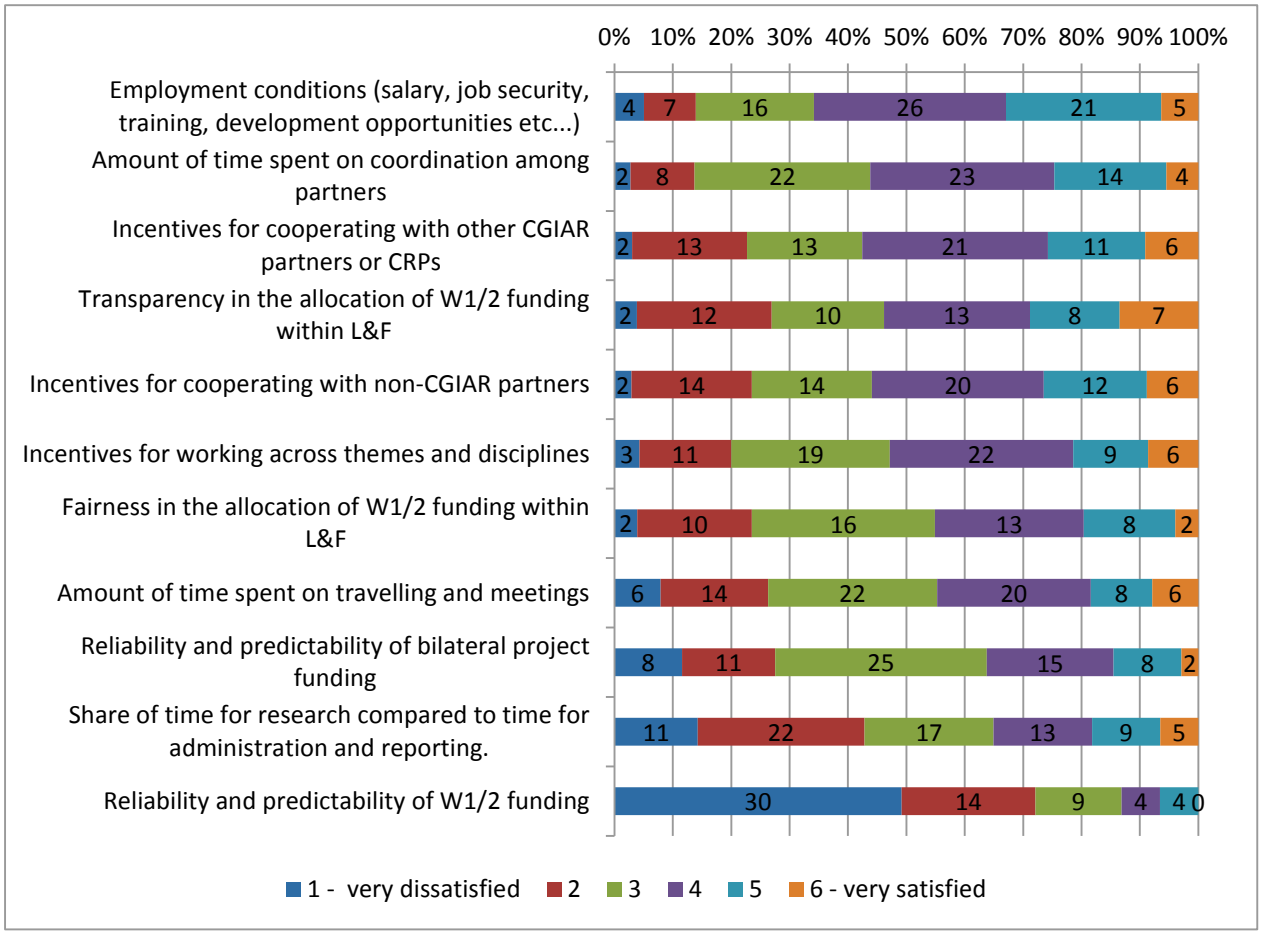
Total responses: 80

QUESTION 25: Please add any comment on capacity development in L&F and how it has effected your work:

- Open ended question

PART V. L&F-RELATED WORKING CONDITIONS

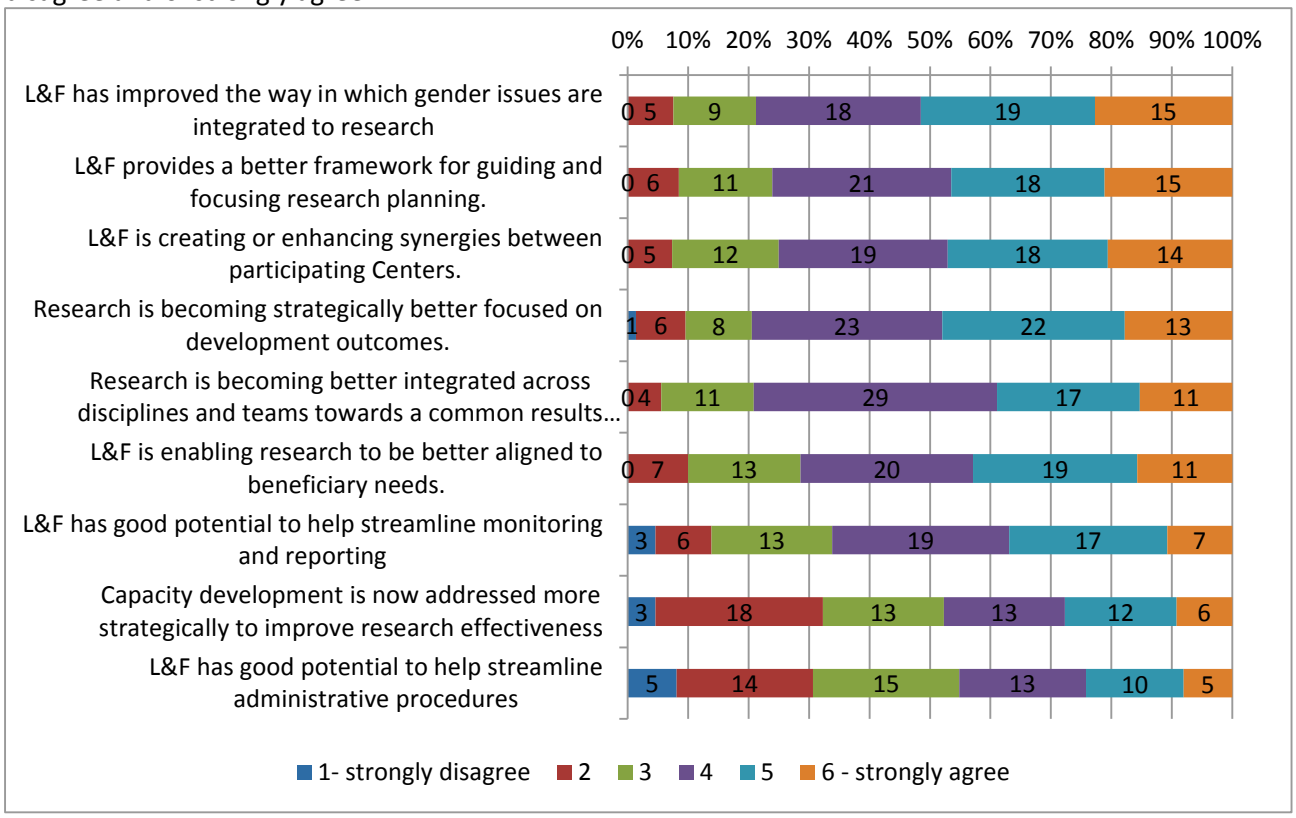
Figure 28: QUESTION 26: Please indicate how satisfied you are with the following working conditions for your work. Please score in a scale of 6 where 1=very dissatisfied and 6=very satisfied.



Total responses: 80

PART VI. VALUE ADDED

QUESTION 27: Please indicate your agreement with the following statements related to the value the L&F has had or is likely to have influencing the success of your research compared to past Center-based implementation of the research. Please score in a scale of 6 where 1=strongly disagree and 6=strongly agree



Total responses: 80

QUESTION 28: Please add any comment on the value-added or negative value from research implementation through L&F that you have observed or expect in the future.

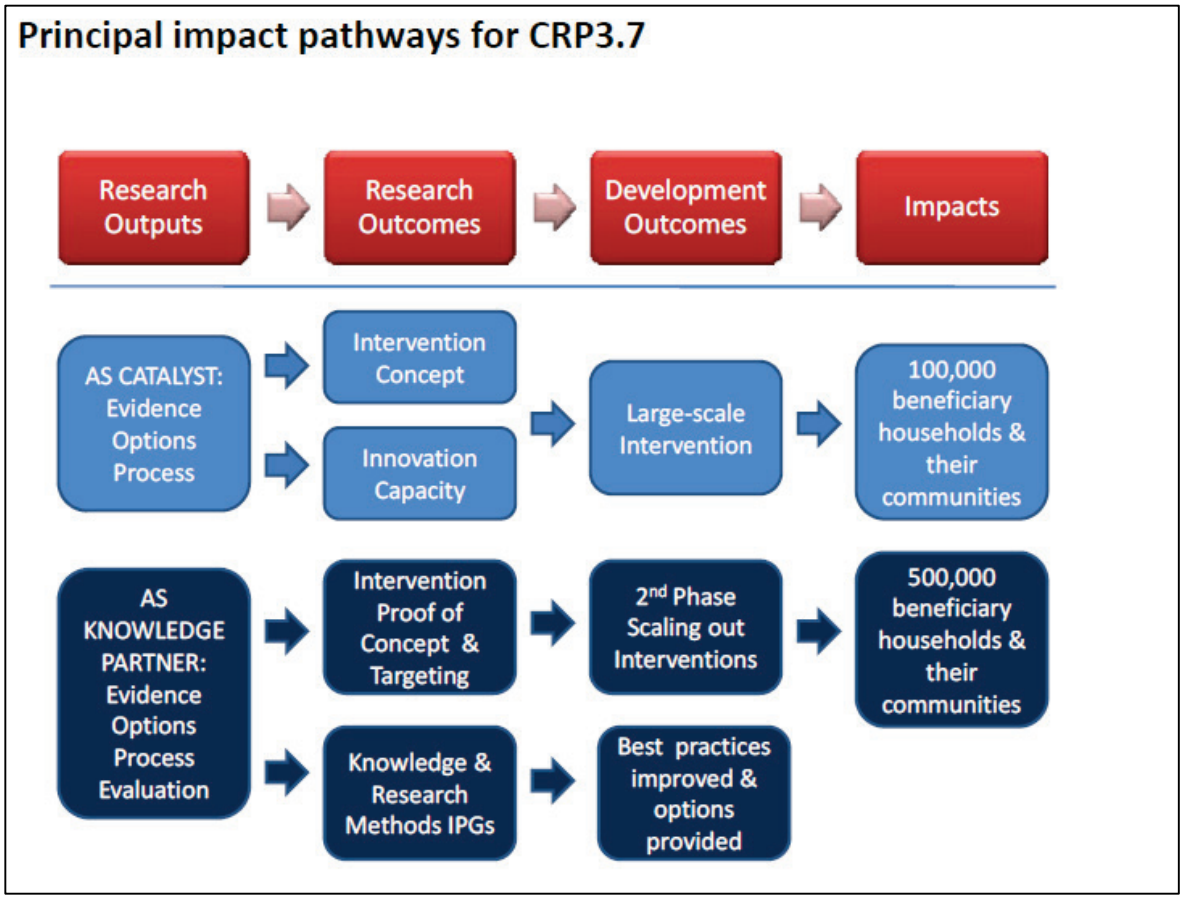
- Open ended question

QUESTION 29: Please add any suggestions on what could be done differently.

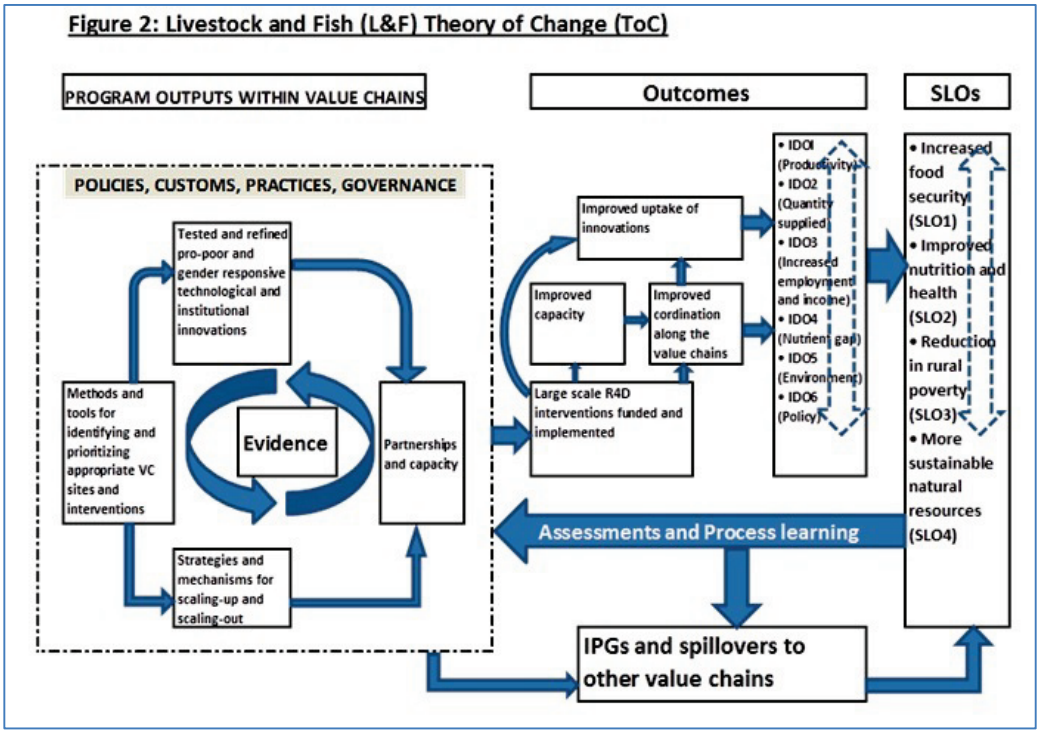
- Open ended question

ANNEX H: L&F IMPACT PATHWAYS AND THEORIES OF CHANGE

Impact pathways, programme proposal, 2011

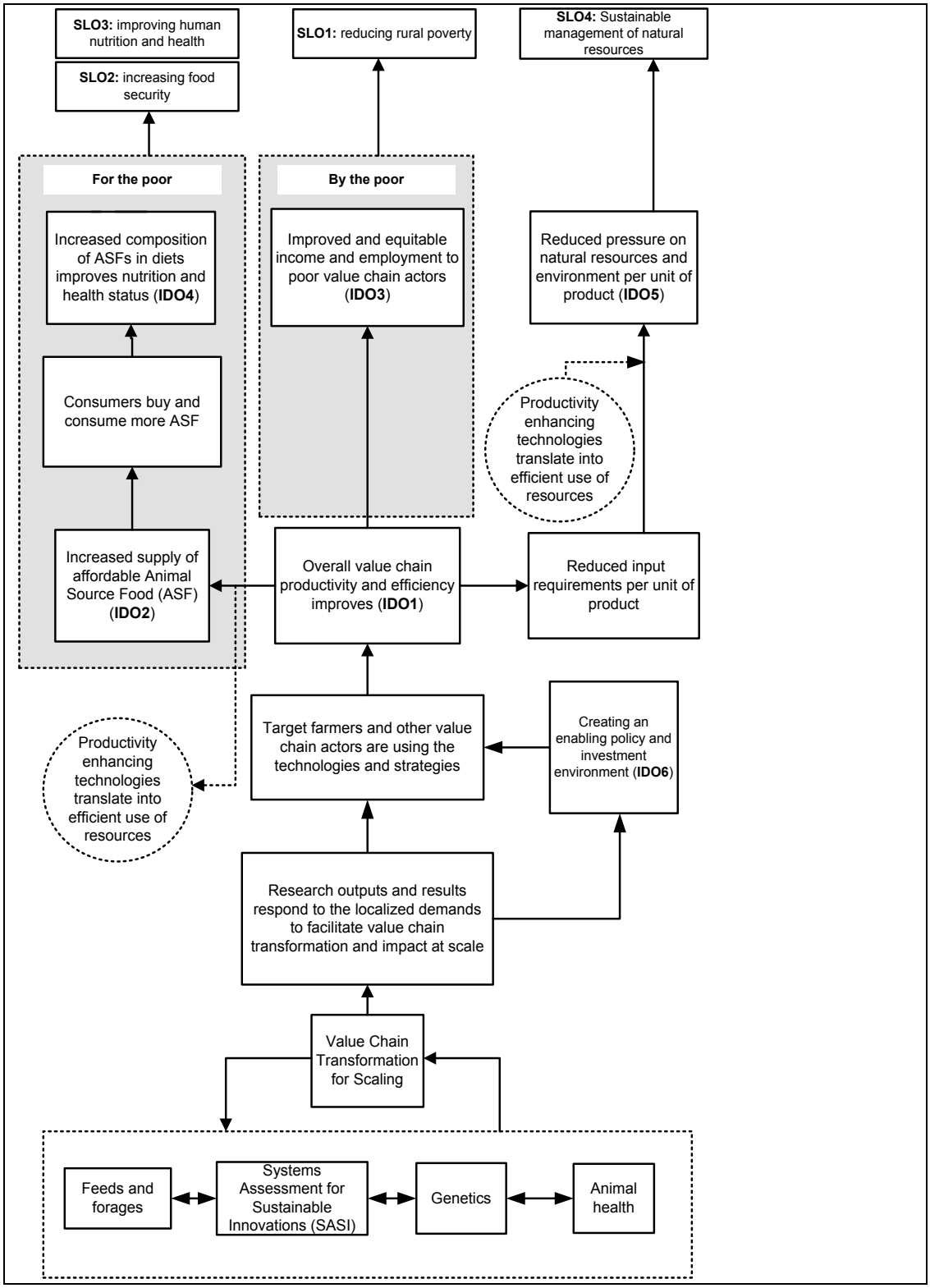


Theory of change for the programme, from the L&F wiki, 2013

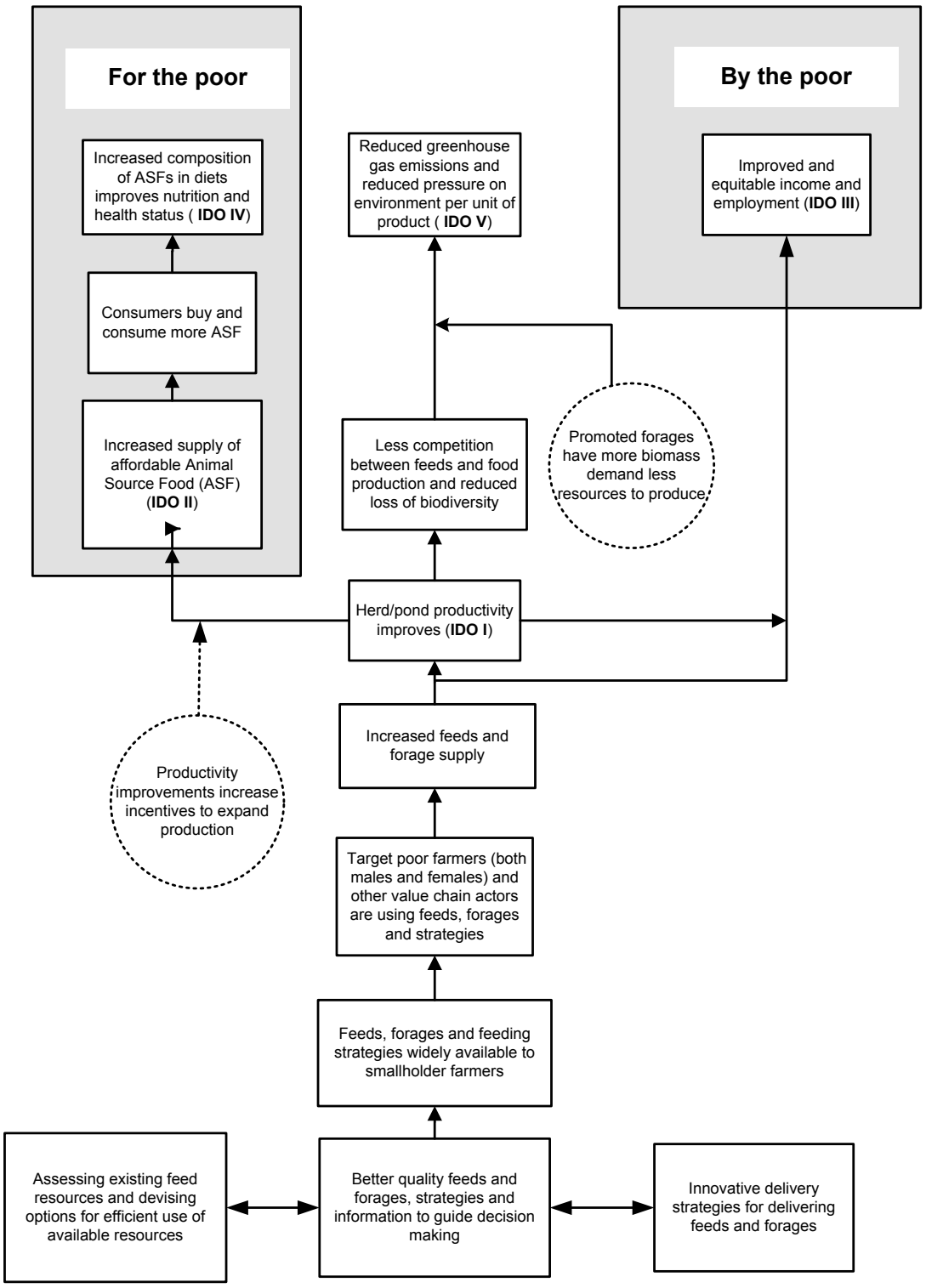


Theories of change described on 29/07/2014

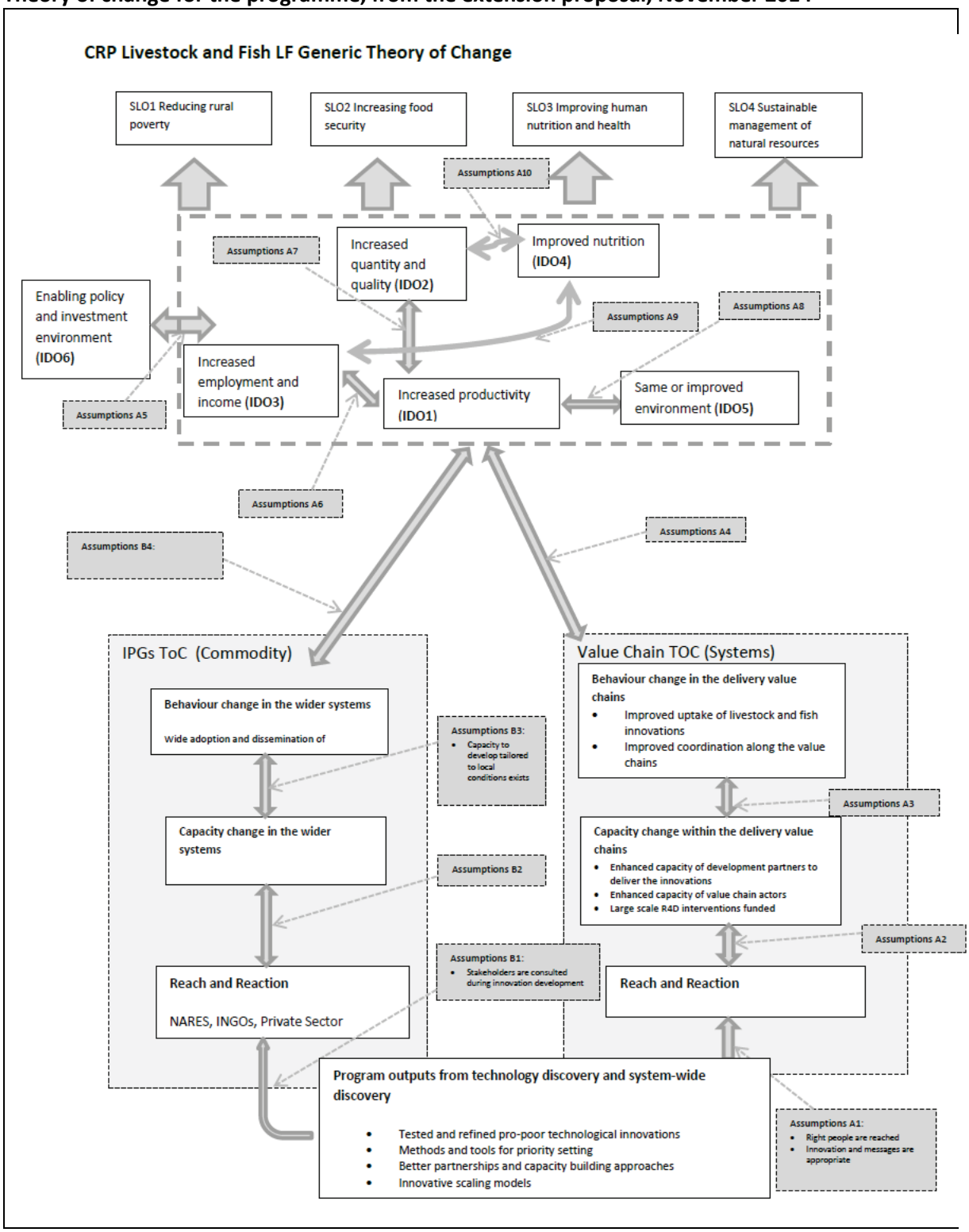
a) For the whole programme



b) For the feeds and forages flagship



Theory of change for the programme, from the extension proposal, November 2014



ANNEX I: Extracts from flaghsip programme case studies

The following provides a summary of the analysis of relevance and coherence from the FP case studies developed by the evaluation team.

Animal health/ East Coast Fever Vaccine Development

Programme content

ILRI has, in the past, been involved in production and the research into production processes of the East Coast Fever (ECF) infection and treatment (ITM) vaccine, an immunisation procedure involving inoculation of cattle with live ECF parasites combined with simultaneous treatment with an antibiotic. L&F is attempting to a) improve aspects of the current ITM ECF vaccine and b) develop a sub-unit vaccine against ECF, which would not require simultaneous treatment with antibiotic, and which would be more feasible/attractive to commercialise by current vaccine manufacturing companies.

Relevance to livestock sector needs.

The research is relevant to small-scale and extensive cattle keepers in 11 countries of East, Central and Southern Africa where ECF occurs. ECF is a devastating disease of cattle caused by a single-celled parasite, Theileria parva (T. parva), and carried by ticks feeding on cattle. More than 45 million of the region's 75 million cattle are at risk of ECF and many of the cattle owners are resource poor. It is difficult to prevent the disease through management procedures including the frequent use of acaricide treatments involving drugs which pose a risk to humans handling the cattle and the dips. This stimulated development of the current ECF Infection and Treatment Method (ITM) vaccine.

There a number of drawbacks to the ECF-ITM vaccine, including the complexity of the manufacturing processes required for vaccine production. A sub-unit vaccine, based on carefully chosen protective biological molecules, rather than live parasites, would be cheaper, safer and much more convenient to use than the current ECF-ITM vaccine.

Alignment with L&F objectives

If production methods for the ECF ITM vaccine are improved this should cut the cost of production and reduce the price of the vaccine to farmers. The Global Alliance for Veterinary Medicines (GALVmed), a development partner of L&F, have supported the production of recent batches of ECF ITM and their distribution in a number of East African countries. Data provided by GALVmed, indicated that approx. 737,860 doses of ITM had been distributed, 44% of the target for the period. It would have been convincing if the L&F programme team had collated similar data for the ECF ITM vaccine and other potential outputs. If successful, the development of a sub-unit vaccine would simplify delivery of the vaccine, could further reduce cost, and have a positive impact on African livestock keepers in future years and decades.

Coherence within L&F

The research area contributes to two L&F research lines, namely:

1. Improved technologies to sustainably increase productivity and efficiency of livestock and fish production (short-term adaptive research for development and longer-term upstream research)

2. Development strategies for pro-poor, gender-equitable value chains for livestock and fish products (more downstream, improving delivery systems, and developing value chains)

The FP has four activity clusters:

1. Animal Health Assessment and Prioritization

2. Animal Population Health and Food Safety

3. Disease Diagnostics and Vaccines

4. Delivery Systems

The vast majority of budgets (both through L & F and bilateral funding) and thus staff time, have been spent with reference to cluster 3 (solely vaccines in the case of ECF-ITM). ECF research contributions to cluster 1 came mainly through earlier work performed at ILRAD and ILRI. Ongoing L&F research explores possible use of the current and new vaccine at the population level, thus contributing to cluster 2. However efforts on cluster 4 are being conducted by others and there was a disappointing lack of reference to this approach by staff in the L & F programme.

Animal health/ Research on African Swine Fever

Programme content

The African Union's Interafrican Bureau for Animal Resources (AU-IBAR), the Food and Agriculture Organization of the United Nations (FAO) and the International Livestock Research Institute (ILRI) have jointly developed a regional strategy for the control of African swine fever (ASF) in Africa. The proposed strategy will constitute a milestone in the fight against ASF and will provide the framework for cooperation.

African Swine Fever (ASF) research at ILRI began in 2005 in collaboration CISA-INIA, Spain and funded by the Spanish government. The research, incorporated into the BeCA-ILRI Hub mainly aimed at evaluation of the epidemiological situation of ASF in Africa, through characterization of currently circulating field ASF virus isolates, and development and validation of sensitive diagnostic techniques, including pen-side tests.

From 2012, working with BecA-ILRI in partnership with CSIRO and funded by DFAT Australia studies were conducted in the border region of Kenya to generate quantitative data on pig husbandry systems and associated production constraints, in particular relating to ASF.

The ASF research project is therefore an example of a legacy project from ILRI although of considerably shorter duration than the ECF ITM research area.

Relevance to livestock sector needs. ASF can cause up to 100 percent mortality in domestic pigs. The disease is of global concern because of the lack of a vaccine or any curative measures. 25 African countries reported the disease in 2012. It has also, since 2007 been reported in wild boar and/or domestic pigs in Georgia, Armenia, Russia, Ukraine, Belarus, Lithuania Poland, Latvia and Estonia, and has been present in the Italian island of Sardinia for several decades. As no vaccine exists, control is only possible by culling and movement control.

Alignment with L&F objectives

When present, ASF causes economic loss and can impact on household food security. Pig sector growth is particularly important in developing and transition economies. ASF can cross international borders through animal-to-animal transmission ore through trade – therefore prevention and control have the potential to contribute to IPGs.

Coherence within L&F

The ASF project includes research on epidemiology, diagnostics, social science, and genetics of the ASF virus. As articulated to the evaluation team, it appears internally coherent, with links between laboratory and field work, with links between them. Staff at ILRI involved in the L&F programme have developed a table indicating their plans for the ASF project to fit with the Theory of Change objectives. The activities of the programme are intended to improve capacity to prevent disease spread (through farm biosecurity), diagnose disease and respond to outbreaks (including through provision of compensation. However the evaluation could not assess the extent to which it has been possible to carry out these intentions.

Animal genetics/ Small ruminant breeding

Programme content

The research focuses on small ruminant breeding practices in smallholder communities. This also implies the onset of an organized system that agrees in collecting and sharing data. In terms of animal breeding and quantitative genetics, the genetic flagship has adopted a new strategy to try to overcome past failures in producing and /or disseminating genetic progress in the population. The focus is now to adopt “in the village” selection schemes eventually coupled to nucleus schemes, instead of pure nucleus schemes. The idea is that involvement of smallholder and fully integrating them within the value chain would increase the chance of success of breeding schemes.

Results should include papers that describe breed/population characterization and diversity, genetic parameters and heritability of traits, results of experimental crossing and segregating populations, options for implementing successful breeding programs in different environmental and socio economic conditions and expected impact and success of different breeding schemes in terms of genetic progress.

Relevance to livestock sector needs

The topic is relevant to food security and safety and to the improvement of smallholder livelihoods. L&F's work is done only in two countries of Africa (Ethiopia and Buirkina Faso) but may be more broadly relevant in other African countries where small ruminants are kept.

Alignment with L&F objectives

The choice of Ethiopia and Burkina Faso as study sites, and the topic areas covered by the programme (see list) are relevant to L&F objectives. The papers read and the intentions are coherent with L&F research for development approach. The programme is demonstrating the ability to combine "by" and "for" the poor e.g. in working with smallholder livestock producers in Ethiopia to produce animals for the export market.

Areas covered are comprehensive and include:

1. Characterization of breeds, including with the use of genomic tools combined with novel phenotyping approaches.

2. Assessment of genetic attributes in relation to the needs of men and women farmers and the requirements of markets

3. Use of reproductive technologies and introduction of existing or incrementally improved technology

4. Potential for the use of novel genomic approaches

5. Sustainability under conditions of climate change

Coherence within L&F

The flagship was designed using a multi-actor and multidisciplinary approach, ILRI Genetics group has worked closely with ILRI's Markets, Gender and Innovation Teams, and in collaboration with the farmers, farmer organizations, and other stakeholders. Research areas were selected on the basis of stakeholder and collaborator interest, accessibility, possible impact of the application of research. The small holder breeding program in Ethiopia, visited by the evaluators, is an example of an activity that is promising for having an impact on development and applies sound scientific principles, but it seems that at present scientific research achievements and cooperation activities are somewhat decoupled. A positive aspect is the continuous feedback that researchers have from the stakeholders. This was observed by the evaluators in Ethiopia, where scientists and government representatives communicate with smallholders in one co-operative breeding project

to monitor problems linked to the project and its continuation. In this specific case the cooperative breeding project appears extremely successful and is now being copied by nearby villages.

Animal genetics/ Tilapia genetic enhancement

Programme content

The tilapia genetic enhancement program is a legacy project dating back to 1987 (ICLARM, Philippines) that continues to be the centerpiece of WorldFish's genetics flagship, and is the most visible component of their research program. This project is active at the Center in Malaysia as well as Bangladesh and Egypt. The outputs have been and are being applied globally. Family selection is being used to improve the growth and production of Nile tilapia, *Oreochromis niloticus*. This is solely a WF research effort within the CGIAR.

Since 1987 tilapia genetic enhancement programme has evolved through several stages in the Philippines, Malaysia and Bangladesh. 3 releases have been made in Bangladesh and the name of the line has evolved over time. In Egypt, a selection program was initiated with local Egyptian Nile tilapia, resulting in another improved line that has only been released in Egypt.

The primary trait of focus has been body weight or growth. Responses to selection for reproductive traits, morphology and carcass yield have been measured but incorrectly analyzed, morphology and carcass yield. During and shortly after the transition to the CRP, large emphasis was placed more on theoretical aspects of selection response, particularly the indirect effects of competitive interaction. At the time of the Center visits, it appears that the research effort is trending away from theoretical genetics of behavior, and back towards less complex selection response.

Relevance to aquaculture sector needs

Tilapia is a hardy, fast growing fish, widely consumed worldwide with a reasonable price. Genetic enhancement has been beneficial to poor producers and poor consumers. A note of caution, related to this selection program, there are issues of dissemination of improved germplasm and protection of natural genetic resources and biodiversity.

Alignment with L&F objectives

Tilapia genetic enhancement is highly relevant to the broader development agenda of L&F. It addresses production of food by and for the poor. Germplasm from genetic enhancement program has been released to poor farmers who then produce tilapia for poor consumers. However, as these poor farmers gain economic traction, they prefer to begin raising fish of higher value that would be less accessible to the poor. The poor still benefit from the tilapia production from larger farmers and from employment opportunities at various positions in the value chain. Additionally, this research is relevant to productivity, food supply, nutrition and health, income and employment and the environment. WF philosophy is slightly different from that of other Centers in L&F as the WF development agenda also emphasizes middle income players or higher in the value chain to impact poverty and food for the poor.

However, there have been missed opportunities for greater alignment with user needs which were expressed during the evaluator visit but have not been included in the research programme..

Coherence within L&F

The objectives of the genetics flagship include

1) assessment of new economically important traits & species,

2) development of improved breeds/strains and

3) delivery of improved genetics and assessment of performance in production

The objectives of the tilapia genetics program include the same objectives. The majority of work has related to objective 2. With regards to objective 1, assessment of new species is just underway and assessment of new economically important traits is in the early planning stages except for the measurement of correlated responses to selection for body weight.

Feeds and forages/ WorldFish Feedstuffs

Programme content

Feedstuffs & Forage is a new flagship for WorldFish for which the impetus for its initiation was participation in the CRP. This project is active in Bangladesh and Egypt. Low cost and local feed stuffs are being evaluated by L&F as ingredients for feed, coupled with feed quality analysis. These ingredients are used to develop locally made feeds and to develop small scale feed milling. Best management practices are being developed for feeding fish. The programme also includes new studies in consumer driven human nutrition dimensions.

Relevance to aquaculture sector needs

Very little research on forage is done in aquaculture. At one time in the developing world, grains and plants were directly fed to fish, but production using this technique is quite low and therefore most poor farmers now use feeds. Feed is usually the highest cost of production. If aquaculture continues to grow at its present pace and the need for fish protein continues to grow, the increase in the carbon footprint from fish farming will be huge. To counteract this, efficiencies will need to be made emanating from many disciplines, but feedstuffs and forage will be critical to more efficiently produce feeds, resulting in better feed conversion, made with feeds that generate less of a carbon footprint and made in a way to reduce competition with livestock and humans for these feeds.

Alignment with L&F objectives

The research area aims at reducing feed costs and increasing feed quality for small-scale tilapia producers. If successful it should contribute to increasing small-scale producer incomes and/or reducing prices to consumers and/or reducing the carbon footprint from feed production for

aquaculture. As such it is in good alignment with L&F objectives. An interesting aspect of this research area is that attention to middle-income players is likely to be needed, in order to ensure that necessary investments are made.

Coherence within L&F

The objectives of the F&F Flagship is to: "Create superior feed and forage strategies responding to actual and evolving demands for meat, milk and fish production and design and implementation of equitable feed value chains with reduced ecological footprints" (Blümmel, 2015 PP presentation). As such, the work proposed within aquaculture feeds and forages is consistent.

The objectives of this work are to 1) develop a feed technology platform, networking and analysis, 2) make better use of available feed resources, including improving access of farmers to better quality feed, implementation of "better management" options for fish feeding (Bangladesh and Egypt) and developing small scale business enterprises around feed and fodder and 3) provide more and higher quality feed and fodder.

Since feed is usually the highest cost in aquaculture, this is critically important work. There is also potential for cross-learning between livestock and fish, but this has not yet been realised.

Feeds and forages/ Improved forages

Programme content

Improvement of forages through breeding and the subsequent agronomic and nutritive evaluation is the dominating activity within the F&F Flagship and was therefore of particular interest to study. 'Forage' in this study means perennial grasses and legumes, multi-purpose trees and legumes as well as whole crop/dual purpose cereals and crop residues in the form of stovers, haulms, etc. from annual food crops. 'Improved' means that the species has been subjected to breeding for enhanced traits in terms of agronomic and/or nutritive value.

Plant breeding seems to constitute the major share of work in the F&F at CIAT and also at ILRI and by researchers in South Asia and Africa in collaboration with breeding activities in commodity CRPs such as Maize, Wheat, Grain Legumes, etc. Breeding for improved traits in perennial forages has mainly focussed on grasses and here, the major work has taken place at CIAT (Cali, Colombia) in collaboration with the BecA-ILRI Hub and other international partners such as universities. Target countries have mainly been located in Latin America. Research has very strongly focussed on Brachiaria spp for yield, nutritive value, biological nitrification inhibition, resistance to spittle bugs, waterlogging, foliar blight, acid soils, Al toxicity, drought and other favorable traits has dominated. Superior varieties from CIAT Brachiaria breeding program have been disseminated by Dow Agrosciences but also by Papalotla (Tropical Seeds, Mexico). Some work has been going on with Napier grass looking at its biological diversity and with Cenchrus ciliaris and Chloris gayana. Plans have also been made for a new breeding program with Panicum maximum (now Megathyrsus maximum).

No perennial legume breeding efforts were seen during the visit at CIAT in spite of >19000 herbaceous legume and >2000 shrub legumes accessions collected since 1967. Recent legacy work on Canavalia brasiliensis has been published and on-going studies with the same plant, Leucaena diversifolia and Brachiaria mixtures were witnessed at a CIAT HQ research site including

measurements of cattle gain and C accumulation, BNI, greenhouse gas emissions etc. in collaboration with CCAFS and Humid Tropics CRPs. A limited agronomic study was also done with five drought resistant legumes in Uganda and Rwanda.

L&F does not breed for stover quality in food crops as this is done by commodity CRPs

Relevance to livestock sector needs

Perennial forages play a considerable role in feeding of beef and dairy cattle in South and Central America and in East Africa as well as for small ruminants in East and North Africa. Crop residues play the most important role in West Africa and South Asia. The work done in legacy projects and within L&F on nutritive values and adaptation to climatic stress is all broadly relevant to the needs of smallholder producers.

Alignment with L&F objectives

The goal of the Tropical Forages Program at CIAT HQ is to: "improve livelihoods of poor rural crop-livestock producers while contributing to eco-efficiency of production systems". The objective is to: "explore the benefits of multipurpose forages for improving agricultural productivity while reducing the ecological footprints". These objectives are consistent with those of L&F.

The Feeds and Forages Flagship designs and implements work to:

- reduce feed costs relative to what farmers get for their produce
- provide the feed resources to facilitate increased livestock and fish productivity,
- increase income and livelihoods from feed/fodder value chains and reduce labour/drudgery from feed resourcing and feeding and
- reduce environmental impact from feed resourcing.

These are all relevant objectives for supporting the L&F project and forage breeding can play a major role.

The L&F proposal states that "seeds of forages that improve feed resources in specific targeted value chains should be multiplied and disseminated". A number of improved perennial forages are already available from CIAT and more on-farm research should help in deciding whether or not they fit into existing farming systems in Latin America, Asia and Africa. However seed production on the farm and other practical issues are not easily perceived on a research site.

The programme is comprehensive, but two areas needing greater attention are:

- Greater attention to Africa. The Tropical Forage Program at CIAT has the following priority regions: Latin America and the Caribbean - Nicaragua, Trifinio, Colombia, Haiti; Southeast Asia - Laos, Viet Nam, Cambodia, Myanmar; Eastern, Central and Southern Africa - DR Congo, Rwanda, Kenya, Tanzania, Uganda. The main focus is presently, however, undoubtedly on Latin America.

- Attention to dissemination of improved materials through pathways suitable for smallholders. It seems to be difficult for the breeding programs to cater to the specific needs of the small farmers for economic reasons – small volumes, high distribution costs and low purchasing power. E.g. the seeds produced by Dow today are therefore targeting large Brazilian farms. Small Central American and East African farmers may also benefit from these seeds but likely considerably less than the Brazilian farmers.

Coherence within L&F

The objectives of the F&F Flagship is to: "Create superior feed and forage strategies responding to actual and evolving demands for meat, milk and fish production and design and implementation of equitable feed value chains with reduced ecological footprints" (Blümmel, 2015 PP presentation). Work towards the adoption of simple feed processing options, small scale feed processing enterprises, and efficient and safe feed conservation and storage techniques are therefore highly relevant to the F&F Flagship.

Activities in breeding new grass varieties are in line with L&F development approach but are not specifically targeting small scale farmer needs and this has probably been responsible for the modest uptake by these farmers. Some activities were seen in Nicaragua in incorporation of improved forages in small scale dairy farms. These activities were even more modest in Tanzania and could probably not be blamed only on availability of seeds. In spite of some forage and shrub legumes work at CIAT HQ in collaboration with Humidtropics CRP, little evidence was seen of any value chain activities in Tanzania and Nicaragua. Integration of improved grain stover varieties in India seems to work hand in hand with the output of new and superior grains for food consumption. No information was found on any other countries.

Feeds and forages/ Feed conservation and processing

Programme content

The focus of the Feeds and Forages (F&F) flagship is on Cluster 3 "More feed of higher quality" with an allocation of 50% of the budget for 2014 where work on "Improved Forages" (Case Study 1) is the main activity. Conservation and processing of feeds are very important aspects of efficient utilization of feeds and part F&F Cluster 2.

The case study was chosen because of the apparent importance of the topic and after consultation with L&F scientists. However, the evaluation found the L&F had done very little work on in the research area. All feed conservation publications in the data base of publications provided were based on legacy work and exclusively on ensiling. The period for conducting experiments presented in the two papers on feed processing is uncertain and may partly be legacy.

Relevance to livestock sector needs

Efficient conservation and processing are highly important issues for farmers to make use of available feed resources. Conserving feeds in hot and/or humid climates is a great challenge. Wet conditions make drying difficult, whereas hot conditions make ensiling a great challenge. Storage

of dried concentrate feeds under hot and humid conditions promotes mould growth and production of mycotoxins. Infestation of insects and rodents are other challenges to storage of feeds under farm conditions, particularly in the tropics. Processing can promote storage of feeds, mitigate toxicity or antinutritional properties of feeds, enhance nutritive value of feeds, separate feeds into products for different use or decrease labour associated with feeding and is therefore an important issue. Few of these problems are issues when cattle or small ruminants are only grazing or when pigs and poultry are free ranging. However, during times of feed shortage or when animals (and fish) are kept under more intensive conditions, these issues become important.

Alignment with L&F objectives

The L&F original proposal states that one key activity is to: "develop feed conservation (e.g. hays, silages, meals) approaches suitable to smallholder systems and promotion of best practices in processing and storage of feedstuffs for fish, ruminants and monogastrics including mitigation options for mycotoxin contamination". There were surprisingly few efforts in these areas. Field visits in Nicaragua showed farmers practicing silage making, both in small bags and in pit silos (sorghum and maize) and were very pleased with the results. A manual (in Spanish) for silage making was also in the pipeline at the time of the visit in July. None of the silage studies came from outside of Latin America (Colombia and Honduras). The study on processing of sorghum originated from India and the one on cassava peels from Nigeria. Unpublished work has been going on in India on providing choppers for stover and grasses to decrease wastage. No publications on conservation or processing of concentrate feeds (excluding cassava peels) were found in the data base under L&F.

Even though the few conservation and processing activities are coherent with L&F objectives, they are not particularly prioritized.

Coherence within L&F

Work on ensiling is relevant to the F&F flagship. However so little work has been done within L&F that there is little to say about how it has been integrated within the flagship or the programme as a whole.

Feed conservation is integrated into the Dual-purpose Cattle VC in Nicaragua and on-farm progress is monitored as witnessed upon our visit there. Activities related to straw treatment (biofuel technology) have not yet become any significant part F&F research, judging from only one publication in the area. A very recent paper on processing of cassava peels claims to carry a "huge potential to address feed scarcity" and could be well integrated into L&F activities in the future.