Ensuring that future research is appropriate

RIU

Validated RNRRS Output.

A range of useful outputs have been produced to ensure that livestock research has long-lasting benefits for those it was meant to. Part of this work involved ensuring that the lessons already learned from small stock research are applied in the future. To this end, workshops and publications were used to create a vibrant network of researchers all working in related fields. These efforts are complemented by a decision-support tool designed and tested in Africa and Asia to support researchers conducting nutrition studies in livestock. Manuals and text books have also been produced for a range of audiences. Some are designed to control worms in small ruminants, and are aimed at extension workers and veterinarians. Others deal with wider ranging issues like the role livestock can play in wealth creation.

Project Ref: **LPP26:**
Topic: **7. Spreading the Word: Knowledge Management & Dissemination**
Lead Organisation: **University of Nottingham, UK**
Source: **Livestock Production Programme**

Document Contents:

Description

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Africa,

Target Audiences for this content:

Livestock farmers,

LPP26

A. Description of the research output(s)

1. Working title of output or cluster of outputs.
In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

Networking as a tool to disseminate information and training materials

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Livestock Production Programme

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R7798, P.J. Buttery (University of Nottingham, UK), E. Owen (University of Reading, UK), T. Smith (University of Reading, UK)
ZC0289, P.J. Buttery, E. Owen, T. Smith and collaborators
ZC0304, R. Max (Agricultural University of Sokoine, Tanzania) and collaborators,
ZC0305, J.L.N. Sikosana (Matopos Research Station, Bulawayo, Zimbabwe) and collaborators
ZC0213, E. Owen, A. Kitalyi (Regional Land Management Unit [RELMA}, Nairobi, Kenya), N. Jayasuriya (National Science Foundation, Colombo, Sri Lanka), T. Smith and collaborators

*4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? **(max. 400 words)**. This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.*

R7798
This project was started to **link** researchers concerned with **small stock** studies, initially **goats**, so that problems and solutions could be shared. Over time other small stock were included. Five **workshops** (India, Tanzania, Kenya, Uganda and South Africa) were held and proceedings published (see Annex C Key References). From the fourth workshop (2004) three consortia were commissioned to produce advisory material on the conduct of livestock studies to increase the likelihood of success, and aspects of goat management. The main output was a vibrant network.

ZC0289
A **decision tool** for those planning **livestock nutrition studies** was prepared (2006). Studies included both **on-station** and **on-farm trials** and the **check list** was completed after extensive discussions with experienced researchers from Africa, Asia and UK

- To promote well thought-out, well designed and managed livestock nutrition studies to ensure that limited access to time, money and physical resources are used to best advantage to deliver valid outputs for the intended beneficiaries

ZC0304
Two technical briefs (*Technical manual for **worm management** in small ruminants* (for extensionists) and *Management of **anthelmintic resistance** in gastrointestinal nematodes of small ruminants-A technical brief for veterinarians*) were produced (2006). Both briefs address worms, the most serious disease threat to small ruminants.

ZC0305
Goats are the small ruminants most widely kept by smallholder farmers in the tropics and sub-tropics. Because they **browse** and **graze**, they use natural grazing efficiently. Many trees and shrubs produce **edible fruits**, moderately high in protein, which can be collected and stored for periods of acute feed shortages, e.g. late dry season. The publication, '*The importance of **indigenous tree pods and fruits** in goat diets*' (2006), addresses the role of indigenous trees in natural tropical grazing.

ZC0213
Deliberations at workshops of R7798 highlighted the absence of a textbook dealing with livestock keeping and covering both technical and cross-cutting issues. Also only scant information was available on some 'region-specific' livestock species. Existing textbooks were generally written by 'North' authors often giving a biased perspective to aspirations of developing country farmers and solutions. The textbook, '***Livestock and wealth creation**-improving the husbandry of animals kept by resource-poor people in developing countries*' (2005), addresses these issues.

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	***Technology***	***Service***	***Process or Methodology***	***Policy***	***Other Please specify***
		x	*X*	*x*	

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment.

Projects R7798, ZC0304, ZC0305, ZC0213
Dissemination of knowledge to all stakeholders engaged in keeping small stock. The net-working, based on regular meetings and personal contacts, established through the meetings bridged two continents and several countries. Flexibility allowed development from a goat network to one covering all small stock species. The network played a major role in the development of '*Livestock and Wealth Creation*' (Owen *et al*., 2005), as well as the consortia reports.

ZC0289
A check list to ensure livestock studies are well managed and relevant to the needs of the resource-poor:

- Livestock nutrition research aiming at increased milk production and growth rates with optimum efficiency of feed use
- The procedures described in the check list apply to all well-ordered research processes
- Scaling up activities are also planned to be cross-cutting

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	***High potential***	***Hillsides***	***Forest-Agriculture***	***Peri-urban***	***Land water***	***Tropical moist forest***	***Cross-cutting***
							x

8. What farming system(s) does the output(s) focus upon?
Please tick one or more of the following options (see Annex B for definitions).
Leave blank if not applicable

Smallholder rainfed humid	***Irrigated***	***Wetland rice based***	***Smallholder rainfed highland***	***Smallholder rainfed dry/cold***	***Dualistic***	***Coastal artisanal fishing***
X	*X*	*X*	*X*	*X*	*X*	*X*

The current publications and planned activities apply across all farming systems

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

R7798
Networking, sharing of ideas and training have a major influence on the inpact of research and development aimed at the resource-poor. The model used here for the exchange of problems, methodologies and solutions, through themed workshops and use of the web make communication between practitioners with common interests possible. Further consortia groupings should be considered.

ZC0289

- Properly planned and managed studies to save resources and deliver outputs
- Applicable to field and on-farm studies; Covers livestock nutritional studies;, while many issues are generic, other disciplines may require a check list specific to their requirements
- A training module is needed, covering identification of hypotheses, writing concept notes, interpretating results, writing papers, dissemination material etc. This should form the basis for training scientists and be included in university and extension officer courses.

ZC0213

A follow-up to *'Livestock and wealth creation'* covering feeding strategies to overcome feed scarcity is recommended. Inadequate feed in the dry season is the major constraint facing most resource-poor livestock producers. Technical knowledge (e.g. on fibrous crop residues R5188, R6619) is available but scattered. One publication, with emphasis on practical application within the resource-poor smallholder livestock system, is needed.

These activities are aimed at human resource development within the cadre of stakeholders responsible for developing and supporting the livestock industry and its practitioners in the field.

The outputs of this proforma link with:
R7351 (feeding of tree fruits); ZC0261 (dairy toolbox); ZC0243 (small stock and coping strategies toolboxes); R6593 (Seasonal feed scarcity); R7634 (Goat productivity in Meru, Kenya); R7632 (forages for goats in Nepal); R5188 (sorghum stover and selective feeding); R6199 (box baling for stover, straws and other forages).

R7424 (Tannins and parasites); R8151 (Strategic drug and nutritional interventions for worm control); R6953 (Improving productivity of goats during the rainy season).

Validation

B. Validation of the research output(s)

*10. **How** were the output(s) validated and **who** validated them?*

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation **(max. 500 words)**.*

All the products produced (except ZC0305 which is in press) have been widely circulated in Africa, especially East, West and Southern Africa, and Asia (Bangladesh, India and Nepal).

All the contributors were recognised research workers in either universities research institutions or extension services. The workshops (R7798) brought together stakeholders with similar interests and problems so that so that solutions and dissemination pathways could be discussed and pooled. The outputs of R7798 are aimed at all stakeholders involved with small stock, including policy makers, researchers, extensionists and NGOs, with the intention that relevant information should trickle down to farmers (farmers were invited to the workshops).

At the Uganda workshop (Masaka, 2004) consortia were charged with addressing selected problem on a multi-national basis and three consortia reports have been prepared. The decision check list (ZC0289) is designed for young researchers, extension workers, technicians and their line managers involved in livestock nutrition studies. The objectives are to increase the efficiency with which development resources are utilised and to ensure prompt

delivery of proven outputs to the farmer. The other consortia reports are expected to be used by vets, animal health workers (ZC0304, worm control in small stock and management of anthelmintic resistance) and general extensionists (including NGOs) (ZC0305, role of indigenous trees in small stock production).

Livestock and Wealth Creation (ZC0213) was written, for university and college lecturers and their students, as an overview of the problems of resource-poor livestock keepers in the developing world, and opportunities for wealth creation and alleviation of poverty through better livestock husbandry. Validation was by virtue of the fact that the book was written using a participatory approach and involved 107 livestock specialists (65 from developing countries) from 28 countries.

*11. **Where and when** have the output(s) been validated?*
*Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above **(max 300 words)**.*

- R7798 Five workshops were held (Udaipur, India, 2000; Morogoro, Tanzania, 2002; Embu, Kenya, 2003; Masaka, Uganda, 2004; and Howick South Africa, 2005). The first two meetings brought together predominately researchers concerned with goats and some extension workers; the later meetings broadened to include all species of small stock, ancillary topics, particularly dissemination mechanisms, and an expanded group of stakeholders including local farmers.
- ZC0289 Four meetings were held during conferences/workshops (York & Nottingham, UK, 2005;, Howick, South Africa; and Khon Kaen, Thailand, 2005), resulting in a decision check list for conducting livestock nutrition studies. In addition there were extensive communications by email.
- ZC0304 and ZC0305 developed out of the Masaka workshop (2004) and produced extension materials for the control of worms in sheep and goats and the feeding of fruits and leaves from indigenous trees.
- ZC0213, the textbook (2005), is aimed at livestock lecturers and students concerned with development of resource-poor smallholder agriculture based on livestock. The Livestock Production Programme bought back 2000 copies for distribution to relevant people and institutions in developing countries. Each copy was accompanied by a CD.

All the products should be regarded as cross-cutting and relevant to all production and farming systems, although R7798 and ZC0304 and ZC0305 are probably most relevant in the smallholder dry/cold farming system.

All have been subjected to widespread and critical peer review.

Current Situation

C. Current situation

*12. **How** and by **whom** are the outputs currently being used? Please give a brief description **(max. 250 words**).*

All the publications developed within this project have been made freely available to lecturers, students and researchers in universities, colleges and research institutions, extension staff and NGOs. Relevant information has been included in the small stock toolbox (ZC0243) and the coping strategies toolbox and individual project reports.

*13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used **(max. 250 words).***

- R7798 The publications (see Annex C, FTR Executive Summary and Key References) have been disseminated to all DFID target countries in Asia and East and Southern Africa

- ZC0289 is being used Tanzania at Sokoine University of Agriculture, and the Animal Diseases Research Institute (ADRI); it available in several libraries. In Bangladesh it is being used at Bangladesh Agricultural University, Mymensingh. The Check List has also been circulated in Kenya, Tanzania, Zimbabwe and UK

- ZC0213 *Livestock and wealth creation* has been widely distributed to relevant institutions and individuals in DFID target countries

*14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading **(max 250 words).***

With printed material the scale of use is not measurable. Distribution was achieved and material is still being requested. In the future an impact assessment, e.g. number of citations in recognised journals for *Livestock and wealth creation* is a possibility.

*15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? **(max 350 words).***

The link (R7798) brought together scientists and researchers with a common interest and purpose. The outputs from this exercise (ZC0289, 0304, 0305 and 0213) are intended to assist in disseminating knowledge at all levels of activity; to help researchers improve the quality of their outputs, through carefully researched and planned studies carried out efficiently (cf researcher outputs are the basis of successful technology development; to ensure that extensionists, NGOs etc. have relevant technologies to transfer to farmers; and that farmers are presented with options relevant to solving the constraints facing them). The transfer of information has been greatly assisted by the development of on-farm trial techniques, ranging from researcher-managed to farmer-managed and implemented trials, and involvement of extension workers and NGOs at all stages. The involvement of stakeholders has given a ‘hands-on’ perspective to printed material and a willingness amongst trainers to use the material (e.g. in farmer-field school manuals).

Current Promotion

D. Current promotion/uptake pathways

*16. **Where** is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion **(max 200 words).***

R7798
This activity produced a model for networking which needs fostering. Links formed during the duration of the project are still active (Bangladesh, Agricultural University, Mymensingh; India, Baif, Development Research Foundation; Kenya, Farm Africa; Nepal Agroforestry Foundation; South Africa, Onderstepoort Veterinary Institute; Tanzania, Sokoine University of Agriculture; Uganda, Farm Network; Zimbabwe, Matopos Research Station).
ZC0289
Distribution has included all known relevant university departments and research services
It is envisaged that all these countries and groups would want to be involved in further activities.

*17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. **(max 200 words)**.*

R7798: Networking activity stopped after the 2005 workshop in South Africa. The Proceedings of the meeting were produced as a cd but not widely distributed
ZC0289: This output is a stand-alone product, but should also be built into relevant curricula and training courses and distributed further.
ZC0304 and 0305: Distribution to relevant field workers
ZC0213; Distribution of textbook and cd is yet to be completed

*18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues **(max 200 words).***

R7798

- The model for networking across the small stock sector in several countries and involving several stakeholders should be maintained, communication being via email with online publications with occasional workshops in target regions, perhaps on a regional basis.

ZC0289

- Creation or use of an existing website
- The check list should be included into teaching modules at universities and colleges of agriculture.
- Training courses should be considered and expanded to include: hypothesis identification; writing of concept notes and proposals; interpretation of results; preparation of extension messages; report writing
- This concept should be extended to include activities other than nutrition studies, e.g. forage and pasture studies, managing on-farm trials, *in vitro* techniques, dissemination pathways, development of promotional material Consideration should be given to extending the concept to disciplines other than livestock (e.g. crop production, crop protection, etc.)

ZC0213

This publication should be supported by a further publication covering strategic feeding to alleviate constraints in periods of feed shortages, and make greater use of locally available feeds such as fibrous crop residues (R5188, R6619)

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? ***(max 300 words).***

Not directly applicable but support and training of extension workers, research workers is essential to get knowledge effectively disseminated to poor people

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Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

The outputs from this cluster are concerned with human resource development. Their impact is aimed at those involved in the process of developing and disseminating information. The intention is to improve both the technology generated and the pathways used to inform farmers. However, no impact studies have been carried out.

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) ***(max. 500 words):***

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

For this cluster it is not possible to give an objective assessment. However, the outputs have been generated to improve the quality, efficiency of procurement, relevance and timeliness of the support available to the resource-poor. Continuous training and sharing of ideas, supported by information relevant to the poor, is needed for impact.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? ***(max 300 words)***
This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

The outputs all promote responsible livestock production, thereby minimising the effects of degradation and pollution.

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? ***(max 100 words)***

Promotion of technology that can increase livestock numbers without consideration of controlled marketing can have an adverse effect on the environment. This criticism is often levelled at goats, but controlled goat keeping is often the best entry point into ruminant production. Environmental issues should be included in training programmes.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? ***(max 200 words)***

Because of the likelihood of climate change, especially global warming, livestock researchers should address the problems of desertification (Smith and Wangiri, 1996) and nutrition, particularly forage production, in an increasingly arid environment. Because of the lack of research resources, all studies should be well planned and this output indicates how this should be achieved.

Annex

Annex C

Executive Summary

A series of Livestock Production Programme (LPP) programmes were linked to promote: (1) the sharing of good practice between the projects; (2) awareness and training in rigorous experimental approaches; (3) the importance of appropriate dissemination techniques for research and development programmes; (4) assessment of the impact of the programmes; (5) development of multi-national programmes to improve the impact of the individual projects. The project was originally conceived to involve three projects involving the use of tanniniferous feeds in small ruminant production. The success of the initial collaborations indicated that there was considerable potential in this approach and the programme was extended to cover many of the LPP projects involving small

stock. The main activities of the project was the organisation of five workshops, each held in a target region and as the project developed involving increasing numbers of local farmers, non-governmental organisations (NGO's), national agricultural research services (NARS) and donors. The proceedings of four of the workshops were published. In addition five multi-national projects were established. Four focussed upon dissemination of information relevant to the impact of small stock on the livelihood of resource-poor farmers and one on the effective and efficient design of animal nutrition studies. A network of workers in development from 20 different counties was established. As a result of the activities the impact of the individual projects was greater than the sum of the individual projects.

Key references/outputs

(i) Smith, T., Godfrey, S.H., Buttery, P.J. and Owen, E. (ed.). 2002. *Helping smallstock keepers enhance their livelihoods: improving management of smallholder owned sheep and goats by utilising local resources*': Proceedings of the second DFID Livestock Production Programme Link Project (R7798) Workshop for smallstock keepers. Sokoine University of Agriculture, Morogoro, Tanzania, Tanzania 8-10 January 2002. Natural Resources International Ltd., Aylesford, Kent, UK, ISBN:09539274-4-x

Theme: The need for experimental rigor in undertaking animal studies associated with livestock development

(ii) Smith, T. Godfrey, S.H., Buttery, P.J., Owen, E. (ed.). (2004). *The contribution of small ruminants in alleviating poverty: communicating messages from research*: Proceedings of the third DFID Livestock Production Programme Link Project (R7798) workshop for small ruminant keepers. Izaak Walton Inn, Embu, Kenya, 4-7 February 2003. Natural Resources International Ltd., Aylesford, Kent, UK,

Theme: The importance of and techniques used for communicating the messages of development research.

(iii) Smith, T., Godfrey, S.H., Ssewannyana, E., Buttery, P.J. and Owen, E. (ed.). (2005). *Small stock in development*: Proceedings of a workshop on enhancing the contribution of small livestock to the livelihoods of resource-poor communities. Hotel Brovad, Masake, Uganda, 15-19 November 2004. Natural Resources International Ltd., Aylesford, Kent, UK.

Theme: Continued development of skills in dissemination with more emphasis on a wide range of small stock. The value of combining the expertise and knowledge developed in individual projects from different target regions explored and as a result four multinational dissemination projects were instigated.

(iv) Smith, T., Vatta. A.F., Buttery, P.J., Owen, E. and Richards W.I. (ed*.). Making a difference: improving the livelihoods of resource-poor small stock keepers'.* Proceedings of a workshop 'Improving The Well-Being Of Resource-Poor Communities – The Role Of Small Livestock' in Howick South Africa between 12th to 15 th September. Natural Resources International Ltd., Aylesford, Kent, UK. (available as a CD).

Theme: The impact of small stock on the livelihoods of communities. This workshop included visits and subsequent workshops on the impact of small stock on the nutrition and health of both rural and urban communities.

Three projects involving international consortia and focusing on dissemination of information relevant to the contribution of small stock to the well-being of resource-poor farmers delivered outputs

(i)The importance of indigenous tree fruits (pods) and foliage in goat diets (ZC0305)

J. L. N. Sikosana[1], B. R. Banstola[2], H. K. Shrestha[3], M. M. Hossain[4], R. H. Sarwer[4], J. Kabirizi[5] and F. Ejobi[6]

[1]Department of Agricultural Research and Extension, Matopos Research Station, Private Bag K 5137, Bulawayo, Zimbabwe; [2]Bovine Research Programme, Nepal Agricultural Research Council, PO Box 1950, Kathmandu, Nepal; [3]Planning Division, Nepal Agricultural Research Council, Singhdarbar Plaza, PO Box 5459, Kathmandu, Nepal; [4]Department of Animal Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh; [5]Namulonge Agricultural and Animal Production Institute, PO Box 7084, Kampala, Uganda; [6]Department of Veterinary Public Health and Preventative Medicine, Makerere University, PO Box 7062, Kampala, Uganda

(ii)Joint dissemination of outputs from LPP-funded projects: Preparation and production of: 1 “A Technical Manual for Worm Management in Small Ruminants”; 2) “Management of anthelmintic resistence in gastrointestinal nematodes of small ruminants” (ZC 0304)

R.A. Max[1], M.L Jayaswal[2], A. F. Vatta[3], A. A. Kassuku[1], A. E. Kimambo[1] and L. A. Mtenga[1]

[1]Sokoine University of Agriculture, Morogoro, Tanzania; [2]New Era, Kathmandu, Nepal; [3]Onderstepoort Veterinary Institute (OVI), South Africa.

(iii) A decision-making checklist for animal nutrition studies in livestock development (ZC0289)

P.J. Buttery, *School of Biosciences, University of Nottingham, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK.*
E. Owen, *Formerly of Department of Agriculture, School of Agriculture, Policy and Development, University of Reading, Earley Gate, P.O. Box 237, Reading RG6 6AR, UK*.
T. Smith, *Formerly of Department of Agriculture, School of Agriculture, Policy and Development, University of Reading, Earley Gate, P.O. Box 237, Reading RG6 6AR, UK.*
A. Akbar, *Department of Animal Nutrition, Bangladesh Agricultutal University, Mymensingh 2202, Bangladesh.*
J.N. Clatworthy, *3 The Mead, Ilminster, Somerset TA19 0EY, UK.*
M. Hossain, *Department of Animal Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh*.
A.E. Kimambo, *Department of Animal Science and Production, Sokoine University of Agriculture, P.O. Box 3004, Morogoro, Tanzania.*
A. Kitalyi, *Regional Land Management, Unit, (RELMA) at World Agroforestry Centre, (ICRAF), P.O. Box 30677, Nairobi 00100, Kenya*.
B.A. Lukuyu, *Kenya Agricultural Research Institute, National Agricultural Research Centre - Muguga, P.O. Box 30148, Nairobi, Kenya.*
R.M. Max, *Department of Veterinary Physiology, Biochemistry, Pharmacology and Toxicology, Faculty of Veterinary Medicine, Sokoine University of Agriculture, P.O. Box 3017, Morogoro, Tanzania.*
L.A. Mtenga,, *Department of Animal Science and Production, Sokoine University of Agriculture, P.O. Box 3004,*

Morogoro, Tanzania.
D.M. Mwangi, *Kenya Agricultural Research Institute, P.O. Box 57811-00200, City Square, Nairobi, Kenya.*
E.M. Nengomasha, *Department of Agricultural Research and Extension, Henderson Research Station, P. Bag 2004, Mazowe, Zimbabwe.*
R.A. Pearson, *Centre for Tropical Veterinary Medicine, Division of Animal Health and Welfare, University of Edinburgh, Easter Bush Veterinary Centre, Roslin, Midlothian EH25 9RG, UK.*
J.I. Richards, *NR International, Park House, Bradbourne Lane, Aylesford, Kent ME20 6SN, UK.*
J.L.N. Sikosana, *Department of Agricultural Research and Extension, Matopos Research Station, P. Bag K5317, Bulawayo, Zimbabwe.*

Although not directly managed by the Link Project, the Link and its members were instrumental in developing the concept of and producing a new animal science textbook specifically designed for the target regions of the LPP. The book has 107 authors from 28 countries. The 600 page textbook is aimed at universities, agricultural colleges and similar training establishments as well as extension officers, research and development workers. The full citation is:
Owen, E., Kitalyi, A., Jayasuriya, N. and Smith, T. (ed.) (2005). *Livestock and wealth creation: improving the husbandry of livestock kept by resource-poor people in developing countries.* Nottingham University Press, Nottingham, UK

Smith, T. and Wangiri, (1996). *Desertification control and natural resource management: case studies from SADC countries.* United Nations Education and Scientific Organisation (UNESCO), Dakar, Senegal.