Strategies for feeding smallholder dairy cattle in intensive maize forage production systems and implications for integrated pest management

(DFID/NRIL Project R7955/ZC0180)

Record of Stakeholder Meeting 11 July 2001
Venue: Agriculture Information Centre (AIC), KARI-NARL, Nairobi
Chaired by Drs Jackson Njuguna and Alistair Murdoch

The meeting commenced at 0930h
Dr Njuguna welcomed all participants and invited Dr Kibata to speak.

1.Dr Gilbert Kibata (Head of Crop Protection at KARI-NARL)
Dr Kibata welcomed stakeholders to the Agriculture Information Centre at KARI-NARL in Nairobi. He gave a brief overview of pests of maize and IPM options. The concern that any pesticide use should not be harmful to livestock was mentioned. The challenge of this project was to balance food production and feeding livestock.

2. Introductions
All participants introduced themselves by name and affiliation.

3. Purpose of meeting and of project
Prof Emyr Owen gave a brief history of the project emphasising that DFID LPP was funding it. The LPP goal/purpose to which the project was contributing was drawn attention to, that is,

To improve the performance of livestock in high potential (crop/livestock) farming systems (goal)
Develop and promote strategies to improve the seasonal availability of livestock feed (purpose)


Cattle feeding on dry maize stover at Kiambu, Kenya. The stover on the right is stored for the dry season under a tree.

The four outputs were read out from the project logframe (annexed). The purpose of the meeting was to discuss how we are going to fulfil these outputs (see appended meeting agenda note for detail).
The multi-disciplinary nature of the project and the team was both an opportunity and a challenge.

4. Related projects
Dr Stephen Mugo (CIMMYT) highlighted estimated losses in Kenya associated with stemborer (valued US$90m) and discussed CIMMYT's programmes and other options for stem borer management. ICIPE were looking at biological control while CIMMYT's work was primarily on host-parasite resistance. It was clear that the traits associated with insect resistance (e.g. higher fibre and silica in the leaves, waxier cuticles and toughness causing resistance to biting insects) were also characteristics which would render the maize stover less suitable as a forage.
Breeding for resistance to abiotic stresses was also important in CIMMYT. Cultivars resistant to MSV were under screening and may be available for the project.

Prof Obilana (ICRISAT) highlighted the option of using sorghum crop residues as forage. Sorghum would be an advantage in marginal (low potential) areas where maize crop failures due to drought are more common. Cultivars intended for forage were mainly used for silage - an inappropriate option for smallholder farmers

5. On-farm activities relating to Output 1
Activity 1.1 Report on RRA
Dr Anni McLeod distributed printed copies of the main results of the RRA to all participants, which generated much discussion. The handout, which includes the preliminary conclusions, is appended.
Points to note include
a) Objectives - the aim was to complement and not duplicate work done in previous projects. The distinctive focus of the study was on the interaction between dairy and maize.
b) A major aspect was to achieve a bridge-building exercise between people with different expertise and to develop a research / extension / farmer linkage for the project.
c) It was an RRA but there was much farmer participation in record taking.
d) The 10 villages selected in Kiambu covered a wide range of ecologies and farming systems including tea/dairy, coffee/dairy, horticulture/dairy and maize/dairy, stratified further by predicted incidence of MSV. Rainfall distribution was mostly bimodal, but one village was drought prone and had only one reliable crop per year, while the two tea-dairy villages could plant all year round.
e) The poverty focus was highlighted especially in Kiambaa where farmers were landless and leased land at some distance from the homestead. These poorer farmers had to use fertiliser rather than manure due to the difficulty of transport.
f) Forage was most limited from Jan-March. The cultivars selected in the short rains (500 series hybrids) were chosen on the basis of short duration rather than forage. *The hypothesis was proposed that improving stover from the short rain crop would greatly ease farmers' cash flow at the most difficult time of year (Jan-March). If*

weeds/diseases were adversely affecting stover quantity and quality at this time then the hypothesis to be tested is that alleviation of this effect would have a considerable impact on livelihoods.
g) Farmers increased seed rate in order to feed thinnings to livestock.
h) Diseased plants (except smutted heads) were fed to livestock
i) MSV was the most important disease. Its occurrence was inherently unpredictable even over short distances from sources of infection. It was prevalent in both short and long rains. The farmers did not know how to control it other than by crop replacement. Surprisingly, no farmers mentioned the leaf hopper as a vector.
j) Leaf blight may be important but was not recognised by the farmers and may have been confused with frost damage.
k) Weeds (except poisonous ones) were also fed to livestock. The second weeding was delayed to provide bigger weeds to feed. Weeds were expensive to control where hired labour was used (herbicides are very rarely used)

Activity 1.3 Proposals for Longitudinal study
Dr McLeod highlighted the purpose of the longitudinal study and Dr David Miano led the discussion. It was explained that the longitudinal study would comprise several visits over a period of at least one year to selected farmers in selected villages. At each visit, appropriate scientific observations and measurements could be made on forage and livestock. In addition, interviews with farmers and other stakeholders could evaluate socio-economic factors. One aim was to provide information to assist in evaluating the economic impact of pests, weeds and diseases on livelihoods in terms of project output 3.

From the ensuing discussion amongst the various stakeholders, it was clear that the longitudinal study would need to address several points:
Cultivars: Note differences in the field to MSV
Diseases: Must monitor all diseases; are leaf diseases simply not being recognised? Disease incidence recording sheets and relevant reports may be obtained from Dr Gilbert Kibata.
MSV: Although it was recognised as something which could not be studied in this project, an observational study of MSVD Leaf hopper vector would be useful; why is incidence so erratic? The long distance migration of the vector of the vector was mentioned as a problem. Within this project, a survey of the incidence of MSV within the Kiambu district could assist in output 3.
Smuts - what really happens to smutted heads? what is their feeding value?
Labour for weeding: Quantify acuteness of labour shortage at time of first weeding. What is the opportunity cost of women's and children's labour at time of first weeding?
Weed control: Explore scope for use of pre-emergence herbicide for this first weeding (see outputs of project R7405 - Weed management in maize-based farming systems). Do delays in first weeding affect forage yield and do delays mean that seeds are produced from this first flush of weeds. At second weeding, do delays affect crop yield of grain and/or forage? Do farmers feed seeding weeds to livestock? If so, which ones? Check that Cyperus is not fed to livestock? - What is the consequence of feeding weed seeds to livestock on seed survival/return to the soil?
Intercropping: Explore scale of intercropping; its effect on weeds/weeding and quantity and use of bean hay for forage needs to be monitored. Do farmers select bean cultivars known to suppress weeds?
When is maize harvested and for what purposes (green?)? Do farmers growing green maize have intercrops?
Manure and composting: Likelihood of seeds/spores surviving processing
Manure use – Dr Dannie Romney has extensive results on this. However, she has no information on the likelihood of returning weed seeds and fungal spores to soil.
Thinnings: The work of Ben Lukuyu should be consulted before embarking on new work.
Method of **land preparation** needs to be monitored (any existing surveys should be checked).

6. Outputs 1 and 2 On-station experiments
Activity 1.4 Experimental programme to assess forage yield and quality.
Dr Murdoch introduced objectives as highlighted in PM.
Dr Khan (ICIPE) was invited to describe the push-pull system for stemborer control. In high potential areas farmers selected Napier as an attractant for the insect (on which egg development is discouraged) while intercropped Molasses grass was sown repelled the insect. Napier and Desmodium were used similarly in low potential areas with Striga.

Which disease should be studied in Activity 1.4? It was agreed that MSV was the most important disease to be studied. Its unpredictability was, however, a disincentive to adoption of prophylactic measures.
The experimental study should focus on the effect of time of infection by MSV on forage and grain yield and forage quality.
Maize cultivars – a minimum of three should be used –
Local (Kikuyu); commonly-used hybrid; new MSVD resistant (not yet released to farmers)
As much information as possible on the new MSVD resistant cultivar is needed from breeders.
Weeding regimes? Pre-emergence herbicide + second hand-weeding; two hand-weedings as now; plus or minus bean intercrop (designed to smother weeds); earlier second weeding to limit seed production by weeds; weedy control; weed-free control.
Fertiliser rates? Use typical farmer rates - what about manure as the poorest may only have access to manure?

Activity 2.1 On-station trials to assess (fungal foliar) disease and weed transmission to subsequent crops after feeding & composting. Introduced by Dr Jackson Njuguna

A possible hypothesis to be tested is that the use of weeds (diseased material) as forage may increase weed infestations (disease) in next crop.

Disease options: head smut; common rust; turcicum blight; common smut

Agreed that preliminary studies on both blight and head smut were needed.

Bear in mind also that animals refuse to eat some parts and these may be disease carrying. Impact of composted refusals must be checked as well as material actually consumed.

Weeds: Gallinsoga, Bidens, Amaranthus, Digitaria, Commelina

Does Commelina produce viable seeds? AJM to check.

Caution on couch and Commelina as they reproduce vegetatively.

Cyperus not to be studied as not generally fed to cattle.

8. Output 4 Extensionists and farmers trained.

Activity 4.1 NGOs to participate in dissemination. Farmer field days.

NGO reps were invited to comment on the relevance of the project to their objectives and whether they would be interested in participating in dissemination.

Mr Mwaura spoke on behalf of Greenbelt and also of KIOF, which was represented by Ms Pauline Gicheru. Greenbelt is active in 29 districts and is a very large grass roots organisation. Organic farmers were very concerned about compost quality and an answer to the question - does it transmit diseases/pests/weeds. Mr Mwaura encouraged us to monitor traditional indigenous methods of control for stem borer and use of wood ash.

Mr Owen Karonge of Youth Action in Rural Development had links with 3000 farmers and the NGO sought to promote sustainable agriculture.

All three NGOs represented would be most interested in disseminating relevant results and asked to be kept informed of progress.

All present were invited to mention other NGOs which might be interested. Some were mentioned and Dr Gilbert Kibata also has lists of NGOs.

In terms of dissemination, it was proposed that representatives of Kenyan Universities should be invited to the next meeting.

Extension services representatives were then invited to comment on their involvement in dissemination. The importance of farmer adoption was emphasised. Extension offered to organise on-farm demonstrations. Organisation of a field day would not be a problem especially in the coffee zone.

9. Links/add-ons

Time of feeding the weeds - before or after seeding.

Survival of turcicum blight conidial spores in forage must be included as an add-on

Grey Leaf Spot - invite person in this project to next stakeholder meeting.

Would it be possible to establish a maize cluster or is there already one? Apparently the one proposed for Kenya, did not get off the ground.

The next stakeholder meeting is scheduled for November 2002.

Dr Njuguna thanked all participants for their contributions and closed the meeting at 1705.

Minutes recorded by Dr Jedidah Maina and Dr Murdoch and checked by project team.

Appendices:

1. List of participants
2. Agenda of meeting
3. Log frame
4. Project team

Appendix 1 List of participants.

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Appendix 2 Meeting agenda

Strategies for feeding smallholder dairy cattle in intensive maize forage production systems and implications for integrated pest management

(DFID/NRIL Project R7955/ZC0180)

Agenda for Stakeholder Meeting 11 July 2001, starting 8.30 am
Venue: Agriculture Information Centre (AIC), Kibate
Chair: Dr Jackson Njuguna and Dr Alistair Murdoch

A. Introduction and welcome **0830-1000**

1. Welcome

2. Introduction to participants
   Opportunity for all to say who they are and their affiliation and/or role

3. Objectives of project and meeting (AJM/EO)
   Agenda note: The primary purpose is to consult with stakeholders in order to ensure that we will fulfil the outputs the project is contracted to deliver in such a way that the interests and concerns of the various stakeholders in these outputs will be met. The results of the RRA, which was carried out in May and June 2001, will be reviewed and will help to inform the experimental programme. Proposals for the longitudinal study and the experimental programme will be discussed. Dissemination pathways will be reviewed. NGOs will hopefully be involved along with extension service.

4. Related projects
   Short presentations - max 10 minutes - by representatives of other projects

Refreshments break **1000-1030**

B. For the rest of the agenda please refer to the project logframe (Appendix 1)

5. Output 1 On-farm activities **1030-1230**
   Activity 1.1 Report on RRA (AMc)
   Activity 1.3 Proposals for Longitudinal study (Overview of objectives (AMc) and then in specialist small groups to recommend what should be monitored)

Lunch break **1230-1330**

6. Outputs 1 and 2 On-station experiments
   Activity 1.4 Experimental programme to assess forage yield and quality **1330-1500**
   - Introduction/ Objectives (DM)
   - Treatments - which disease? which weeding regimes?
   - Hypotheses to be tested

Refreshment break **1500-1515**

Activity 2.1 On-station trials to assess (fungal foliar) disease and weed transmission to subsequent crops after feeding & composting. **1515-1615**
- Introduction/Objectives (JN)
- Possible treatments
- Hypotheses to be tested

7. Output 3 Economic implications (To be discussed at next meeting)

8. Output 4 Extensionists and farmers trained. **1615-1635**
   Activity 4.1 NGOs to participate in dissemination. Farmer field days.
   Activity 4.2 Training plans
   Next stakeholder meeting

9. Links with other projects **1635-1650**

10. Any other business / Concluding remarks **1650-1700**

APPENDIX 3: DFID/NRIL Project R7955/ZC0180 Logframe

Strategies for feeding smallholder dairy cattle in intensive maize forage production systems and implications for integrated pest management

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Goal			
To improve the performance of livestock in high potential (crop/livestock) farming systems (LPP)	To be completed by Programme Manager	To be completed by Programme Manager	To be completed by Programme Manager
Purpose			
Develop and promote strategies to improve the seasonal availability of livestock feed (LPP)	To be completed by Programme Manager	To be completed by Programme Manager	To be completed by Programme Manager
Outputs			
1. Effects of maize genotypes, diseases and weeding regimes, on total forage yield, forage quality and seasonal forage availability, quantified.	Output 1. Preliminary qualitative assessment (Activities 1.1, 1.2) by month 9. Report on on-farm longitudinal assessment (Activity 1.3), by month 27. Report on maize forage yield and quality (Activity 1.4), by month 27.	Quarterly and annual project reports Peer reviewed papers Extension bulletin Final technical report	Scientific papers and extension bulletin (OVI 4) received and read by target institutions.
2. Effectiveness of improved pest management strategies in reducing foliar fungal disease and weed seed transmission between seasons & increasing forage production, quantified.	Output 2. Report on on-station studies (Activity 2.1), by month 36. Report on on-farm impact studies of "routing" forage through livestock on disease and weed seed transmission (Activity 2.1), by month 36.		
3. Economic implications of maize diseases and farmer-acceptable weeding regimes on grain & forage yield, quality and seasonal availability for smallholder maize-dairy farmers and for landless women livestock farmers, quantified.	Output 3. Report on economic implications of maize diseases and weeding regimes in smallholder maize –dairying (Activity 3), by month 36.		
4. Extensionists and farmers trained to promote sustainable maize-dairying, including how integrated pest management (IPM) may affect the availability of forage	Output 4. Stakeholder NGOs for dissemination to be identified by month 6 (via RRA). Newsletters coinciding with farmer-field days (Activity 4.2), each year. Extension bulletin (Activity 4.1) by month 36.		
Activities	**Inputs**	**Means of Verification**	**Important Assumptions**

1.1 RRA of smallholder perception of impact of maize diseases and weeding regimes on forage yield and quality		Quarterly and annual project reports	1. Field work is not impeded by adverse weather conditions or altered political situation in target country.
1.2 Workshop for participating researchers and stakeholder NGOs to explore smallholder dairy farmers' needs in relation to pest, disease & weed management of maize.		Quarterly and annual project reports. Final Technical Report	2. Collaborating institutes continue to collaborate and their facilities remain operational.
1.3 On-farm longitudinal assessment of (a) impact of maize diseases and weeding regimes on grain and forage yields, milk production and inputs and (b) costs associated with improved maize management practices.			3. Identification of participating farmers and their co-operation is an important prerequisite to setting up field trials.
1.4 On-station, assess forage yield and quality of maize genotypes, at different levels of one major disease (from 1.2 & 1.3). Also assess impacts of selected weeding regimes.			4. Local staff, extension agents, NGOs and farmers are enthusiastic to improved methods being promoted.
2.1 Based on 1.2 & 1.3, conduct on-station trials to assess impact of harvesting, feeding, & composting regimes on transmission of one major disease and weed seeds to subsequent crops.			
3 Evaluate farm-level, economic implications of maize diseases and weeding regimes on grain & forage yield and quality, and on smallholder maize-dairying			
4.1 Workshop to promote improved forage and pest management strategies in intensive maize -dairy smallholder system. Delegates to include selected NGOs, extension agents and NARS.			
4.2Training of extensionists and farmers to promote sustainable maize -dairying, including IPM			

APPENDIX 4: Project team

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EdStakeholder Minutes11Jul01
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25/07/01 14:57