

Dairy Farming in Uganda

Stakeholders Workshop

Hotel Africana, Kampala, 26th April 2006

PROGRAMME

Time	Activities	Presenter/Facilitator
8:30 am	Registration	Sarah Mubiru, NAARI NARO
9:00 - 9:15 am	Welcoming note and agenda	Dr F. Opio, Director NAARI
9:15 – 9:30 am	Self introduction	
9:30 -9:45 am	Introduction to the project activities and workshop objectives	Dr. S. Staal, ILRI
9:45 – 10:30 am	Presentation on the main results of the project	William Nanyeenya, LIRI NARO Sarah Mubiru, NAARI NARI
10:30 – 10:45 am	Farmers feedbacks	Dr. I. Baltenweck, ILRI
10:45- 11:00 am	Remarks by DG-NARO	Dr. D. Kyetere, DG- NARO
11:00 – 11:15 am	Remarks by Minister of State for Agriculture Animal Industry and Fisheries (in charge of Livestock and Fisheries)	Hon. M. Mugenyi
11:15 – 11:30	Tea break	
11:30 – 12:00 am	Questions and introduction of group work	Dr. N. Halberg, DIAS
12:00 am – 12:45 pm	Group work (policy aspects)	One facilitator by group
12:45 – 1:45 pm	Plenary, presentation of group work and general discussion	P. Lusembo, Centre Manager Mukono ARDC
1:45 – 2:15 pm	Discussion on the way forward	Dr. C. Ebong, Head Animal Production, NARO
2:15 – 2:30 pm	Close of the workshop and lunch	Dr. W. Olaho-Mukani, Director Animal Resources, MAAIF

Farmers' Feedback Workshop

Hotel Africana, Kampala, 25th April 2006

PROGRAMME

Time	Activities	Presenter/Facilitator
8:30 am	Registration	Sarah Mubiru, NAARI NARI Joyce Nsimbe, NAARI NARI
9:00 am	Welcoming note including workshop objectives and agenda	Isabelle Baltenweck, ILRI
9:15 am	Self introduction	All
9:30 - 10:00 am	Economic incentives for dairy intensification	William Nanyeenya, LIRI NARO
10:00 -10:30 am	Questions and introduction of group work	Isabelle Baltenweck, ILRI
10:30 - 11:00 am	Tea break	
11:00 - 12:00 am	Group work	One facilitator by group
12:00 am – 1:00 pm	Plenary, presentation of group work and general discussion	William Nanyeenya, LIRI NARO
1:00 – 2:00 pm	Lunch break	
2:00 – 2:30 pm	Nutrient management aspects including alternative improvement options	Sarah Mubiru, NAARI NARI
2:30 -3:00 pm	Questions and introduction of group work	P. Lusembo, Mukono ARDC
3:00 – 3:15 pm	Tea break	
3:15 - 4:15 pm	Group work	
4:15 – 5:15 pm	Plenary, presentation of group work and general discussion	P. Lusembo, Mukono ARDC
5:15 – 5:45 pm	Summarise main points for next day meeting	Sarah Mubiru, NAARI NARI

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Participants Farmers' Feedback Workshop

Names	Institution	Place
Nicholas Ssekabunga	DATIC	Masaka
David Balikowa	DDA	Kampala
Niels Halberg	DIAS	
Apollo Kabanda Ssentamu represented by F. Nahamyia	District Veterinary Officer	Jinja
Lawrence Mayega rep P. Nakatudde	District Veterinary Officer	Masaka
Proscovia Namanda	Enumerator	Masaka
Edward Lujja	Enumerator	Masaka
Emmanuel Rutereza	Enumerator	Mbarara
Sabestian Makumbwe	Enumerator	Mbarara
Asaph Mugizi	Enumerator	Mbarara
M. Sseenoga	enumerator rep	Jinja/ Masaka
Mrs Byekwaso	Farmer	Masaka
Charles Ikoona	Farmer	Jinja
Magid Zaake	Farmer	Jinja
Eugenie Luyuyyo	Farmer	Jinja
Valentin Kaganjwa	Farmer	Jinja
Steven Gabula	Farmer	Jinja
George William Baligeya	Farmer	Jinja
Samuel Basasira	Farmer	Jinja
Akuno Kuka-Amojong	Farmer	Jinja
Joseph Sserinda	Farmer	Masaka
Resty Nassolo	Farmer	Masaka
Twaha Musazi to rep Mr Kiwanuka	Farmer	Masaka
Mohammed Mubiru Ssalongo	Farmer	Masaka
Immaculate Nakalyowa	Farmer	Masaka
Emmanuel Lukera	Farmer	Masaka
Dirisa Kibirige	Farmer	Masaka
Mrs Majere	Farmer	Mbarara
Sedrasi Matimbano	Farmer	Mbarara
Kamugabirwe	Farmer	Mbarara
John Zinatakira	Farmer	Mbarara
Twairo Muhangi	Farmer	Mbarara
Godfrey Tusubira	Farmer	Mbarara
Mrs Katanuzu represntd by Hamuza Tindamwebwa	Farmer	Mbarara
Charles Musabi	Farmer/Enumerator	Jinja
L. Njoroge	ILRI	
I. Baltenweck	ILRI	
S. Staal	ILRI	
William Mwebembezi	Mbarara Local Govt	Mbarara
John Stephen Tenywa	MU	Kampala
Ssebadduka Richard	NAADS Coordinator representative	Masaka
Sarah Mubiru	NARO	Kampala
S. Kayiwa	NARO	Namulonge
Jolly Kabrizi	NARO	Namulonge

Annunciate Nakiganda	NARO	Namulonge
Margaret Nakabiri	NARO	Namulonge
Joyce Nsimbe	NARO	
W. Nanyeenya	NARO	
Steven Kiwemba	Production Officer	Jinja

ASPS: Agricultural Sector Support Programme; DDA: Dairy Development Authority; NARO: National Agricultural Research Organisation, DIAS: Danish Institute of Agricultural Sciences; ILRI: International Livestock Research Institute; NAADS: National Agricultural Advisory Services; ARDC: Agricultural Research and Development Centre; DATIC: District Agricultural Training and Information Centre; National Environment Management Authority.

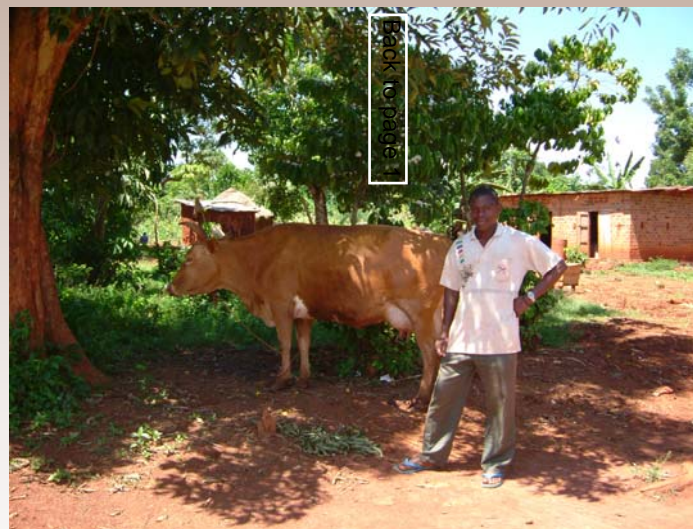
Participants Stakeholders Workshop

Names	Institution	Place
Rilla Norslund	ASPS DANIDA	
Florence Kasirye	Dairy Development Authority	Kampala
David Balikowa	Dairy Development Authority	Kampala
Alex Smith	DIAS	
Niels Halberg	DIAS	
Apollo Kabanda Ssentamu represented by F. Nahamya	District Veterinary Officer	Jinja
Lawrence Mayega rep P. Nakatudde	District Veterinary Officer	Masaka
M. Makuru	Heifer Project International	Kampala
L. Njoroge	ILRI	
I. Baltenweck	ILRI	
S. Staal	ILRI	
Emmanuel Muwanga	Kamenyamigo DATIC	Masaka
T. Todd	Land o' Lakes	
P. Zzimbe	Land o' Lakes	
B. Binbonwoha	Land o' Lakes	
J. Dipio	Land o' Lakes	
Sandra Mwebaze (Rev)	MAAIF	Entebbe
Father Ssenkayi represented by Tamale Sali	MADDO	Masaka
Steven Byenkya	Mbarara ARDC	Mbarara
William Mwebembezi	Mbarara Local Govt	Mbarara
Edward Berinda	Mbarara NAADS	Mbarara
R. Kayongo	Media	
M. Kizito	Media	
P. Kasumpe	Media	
H. Thembo	Media	
J. Mugisha	Media	
S. Zawedde	Media	
A. Nanyonjo	Media	
Peter Ngategize	Ministry of Finance	Kampala
E. B. Bareeba	Makerere University	
Patrice Grimmaund	MU-CIRAD	Kampala
Sarah Mubiru	NARO	Kampala
		Mukono
Peter Lusembo	NARO	ARDC

Cyprian Ebong	NARO	Namulonge
Fina Opio	NARO	Namulonge
Stephen Kayiwa	NARO	Namulonge
Jolly Kabrizi	NARO	Namulonge
Annunciate Nakiganda	NARO	Namulonge
Margaret Nakabiri	NARO	Namulonge
Charles Otim	NARO	Tororo
C. Namazzi	NARO	
D. Kyetere	NARO	
W. Nanyeenya	NARO	
P. Basemera	NEMA	
Steven Kiwemba	Production Officer	Jinja

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EXAMINATION OF THE EFFICIENCY OF PRODUCTION UNDER INTENSIFICATION OF SMALLHOLDER DAIRY IN UGANDA



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Project Goal and Purpose

- Goal: To improve the contribution of smallholder dairying to the livelihoods of resource poor farmers in Uganda
- Purpose: to develop and test methodologies to compare productivity and economic viability of contrasting dairy systems with a view to developing a greater understanding of these systems in order to:
 - Provide information that decision makers can use to inform policy development
 - Identify potential interventions that will improve small farm nutrient management and
 - Identify key characteristics of a farm that can be used to target extension messages



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MOTIVATION OF THE RESEARCH

- Preliminary analysis from a Uganda dairy sector rapid appraisal (ILRI/NARO/MAAIF) (1996) suggested there is little evidence of strong incentives for adoption of more intensive dairy technologies such as zero-grazing
- However, there has been emphasis by some dairy development projects for the adoption of intensive systems.
- Further, it was also evident that opportunities for crop-livestock nutrient interactions were often not being exploited (crop residues and manure use)



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RESEARCH AIMS

- Therefore there was need to research and establish:
 - comparative economic advantages of and incentives for different levels of dairying intensity under various resource, market and policy regimes
 - level of and incentives to crop-livestock nutrient interactions, and consequences for nutrient balances
 - the ecological competitiveness of dairy production at varying levels of intensification, in form of nutrient balance
 - to identify options for improving nutrient balances at various levels of intensification of dairy production



DIMENSIONS OF THE RESEARCH

- Based on these aims, the research looked at two aspects in relation to smallholder dairy farming:
 - Analysis of economic incentives to dairy intensification in Uganda, and
 - An analysis of nutrient balances and options for improvement under different levels of intensification of dairy production in Uganda



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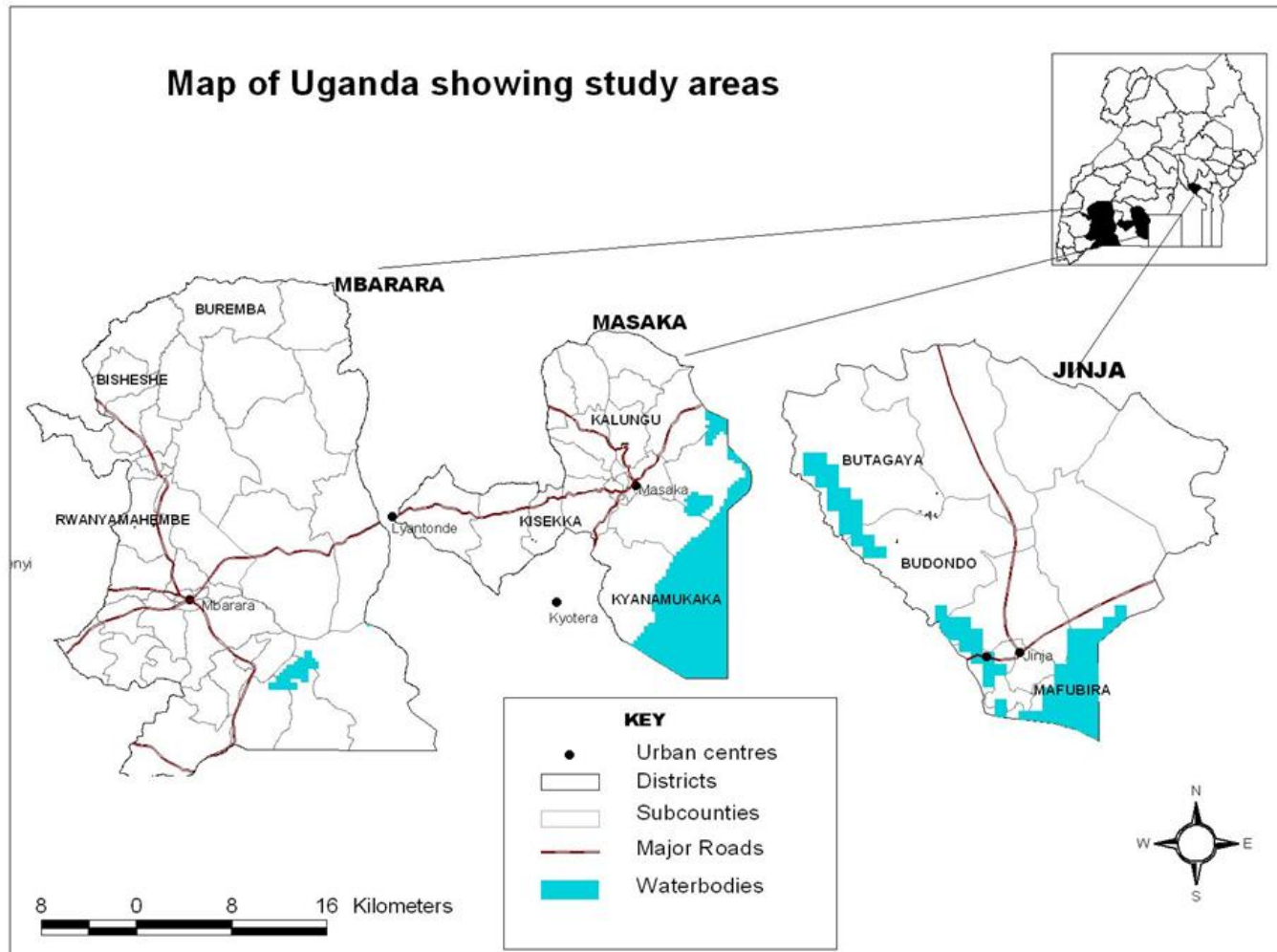


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Study Areas-Dairy Sheds

Map of Uganda showing study areas



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How did we obtain and handle the data? Two surveys.

- A) One visit survey in 2001, 300 geo-referenced households in 3 districts (characterisation survey)
- B) 1 visit per fortnight for 14 months between June 2003 and August 2004, 24 representative farmers (longitudinal survey, in-depth farm monitoring)
- Soil sampling on most plots
- Various methods of data analysis (spatial econometrics, cluster analysis, farm budget, nutrient balance, and linear programming)



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IMPLEMENTING INSTITUTIONS

The project is funded by DANIDA and is implemented by:

- National Agricultural Research Organisation (NARO), Uganda
 - Main research implementation - 2 PhD researchers, William Nanyeenya and Sarah Mubiru
- International Livestock Research Institute (ILRI), Kenya
 - Research coordination and methodological support
 - D. Romney, I. Baltenweck, L. Njoroge, P. Wanjohi, S. Staal, E. Kariuki
- Danish Institute of Agricultural Sciences (DIAS), Denmark
 - Methodological support – N. Halberg
- Makerere University

– Methodological support and thesis supervision



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J. S. Tenywa, J. Mugisha

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Today's Workshop



- Proposed Objectives
 - Present summary of results from the research
 - Present summary from Farmer Feedback Workshop held yesterday.
 - Obtain stakeholder views on validity and implications of the findings
 - Suggest plans for integration of key policy and extension messages and recommendations into on-going development and research activities

Economic incentives for dairy intensification

Presented by William Nanyeenya, LIRI
NARO



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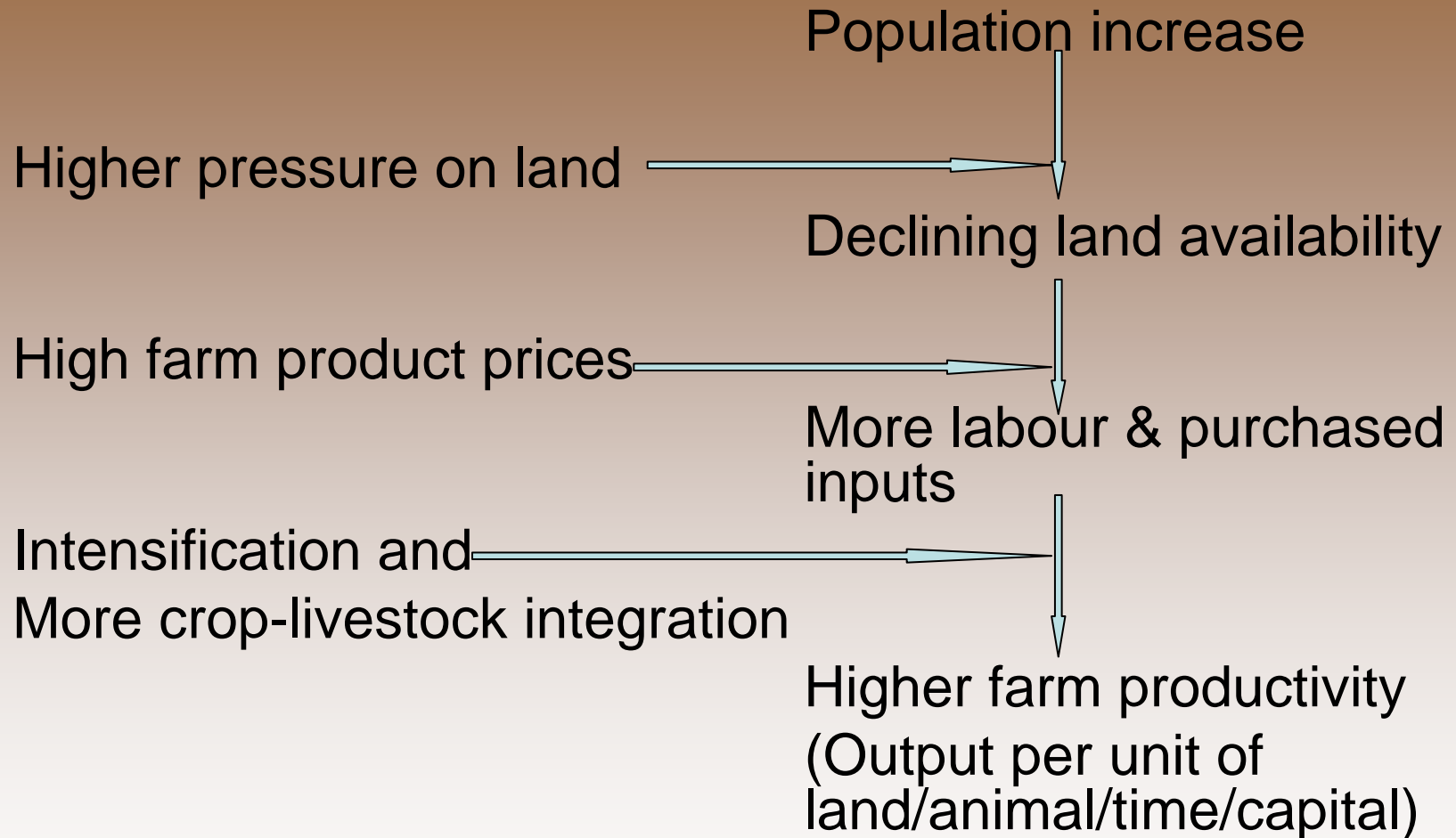
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Motivation for dairy intensification



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Cattle grazing system

Herding

Tethered

Fenced

Zero-grazed



Pastoralism with indigenous cattle	Communal grazing indigenous cattle	Grazing (tether) own perimeter fenced indigenous and/or crossbreeds	Grazing own paddock fenced cross & pure breeds	Zero-grazing purebred dairy
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limited crop-livestock interactions

strong crop-livestock interactions



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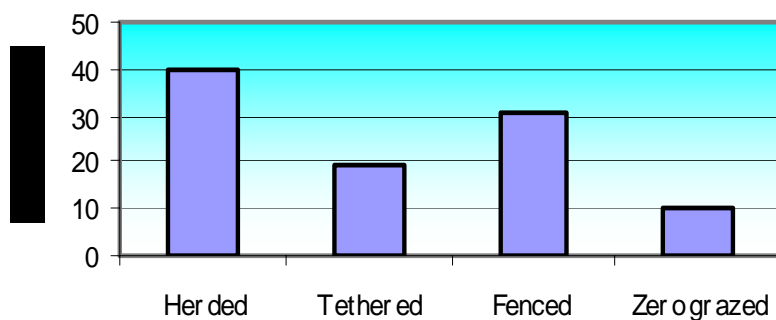
What factors do farmers consider to choose a particular management system?

- Land and labour availability
- Farmer's education, age, sex and experience
- Agro- ecological potential
- Access to a reliable and profitable markets
- Influence by some projects
 - Zero-grazing
 - Upgrading of the herd
 - Promotion of local breed

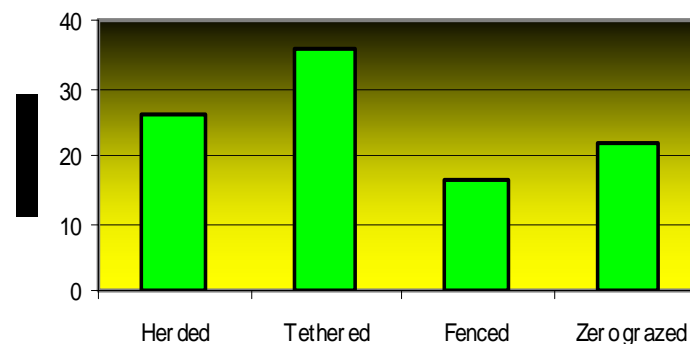


Distribution of dairy grazing systems by study district

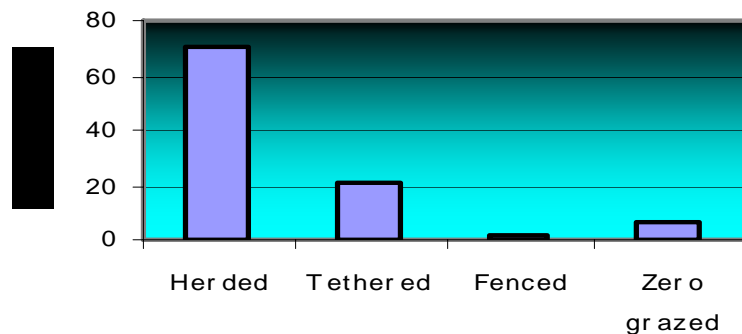
Whole sample



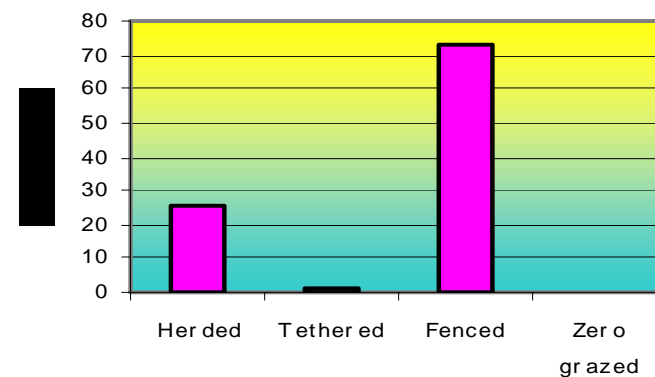
Jinja



Masaka

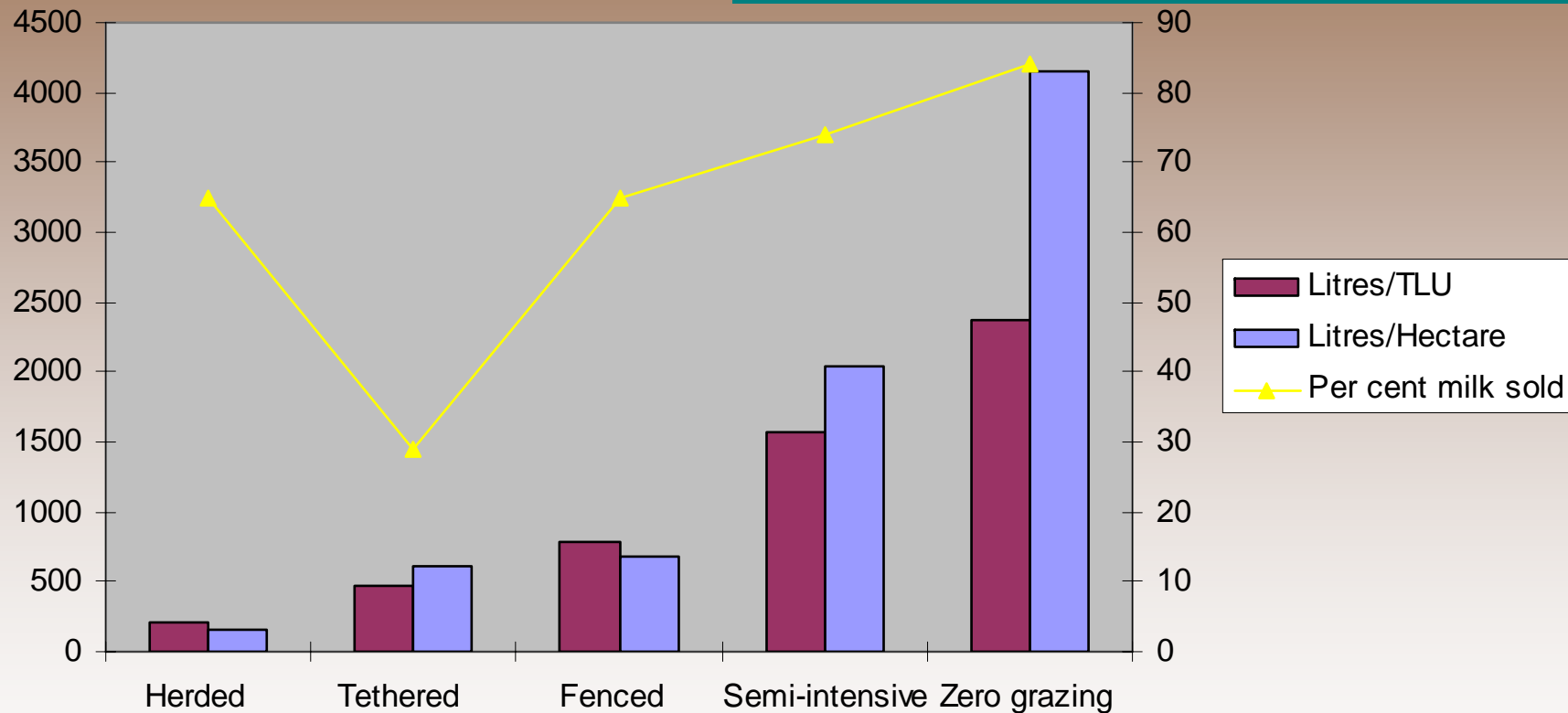


Mbarara



Productivity levels and milk orientation by dairy system

Milk production per animal and per land increases with intensification



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Evidence on drivers of dairy intensification: what does the analysis say?

- Important factors are:
 - Farmer education (+) Strong
 - Human population density (+) Very strong
 - Proximity to milk markets (+) Very strong
 - Proportion of adults working off farm (-) Strong
- Land size is NOT very important



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Evidence on drivers of crop-livestock integration: what does the analysis say?

Feeding crop residue

- Farming experience +Strong
- Human population + Strong
- Distance from major town - very strong
- Good weather conditions - Strong

Manure application

- Cattle density + Strong
- Population density + Strong
- Proportion of adults working off farm + very strong
- Distance to major roads - Strong



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How profitable are dairy-based production systems, and how can they be improved?

- Net farm benefit = revenues from all farm activities (including the home consumption of the farm outputs (crops and milk) minus all expenses relative to farm activities.
- Dairy benefits = revenues from sale of milk and animals, milk consumed by the household, minus all expenses relative to dairy.
- A linear programming model looks at farm options that maximises benefits and can therefore be used to assess individual farmers' efficiency by looking at the difference between current (or observed) farm plans, and profit maximisation plan.



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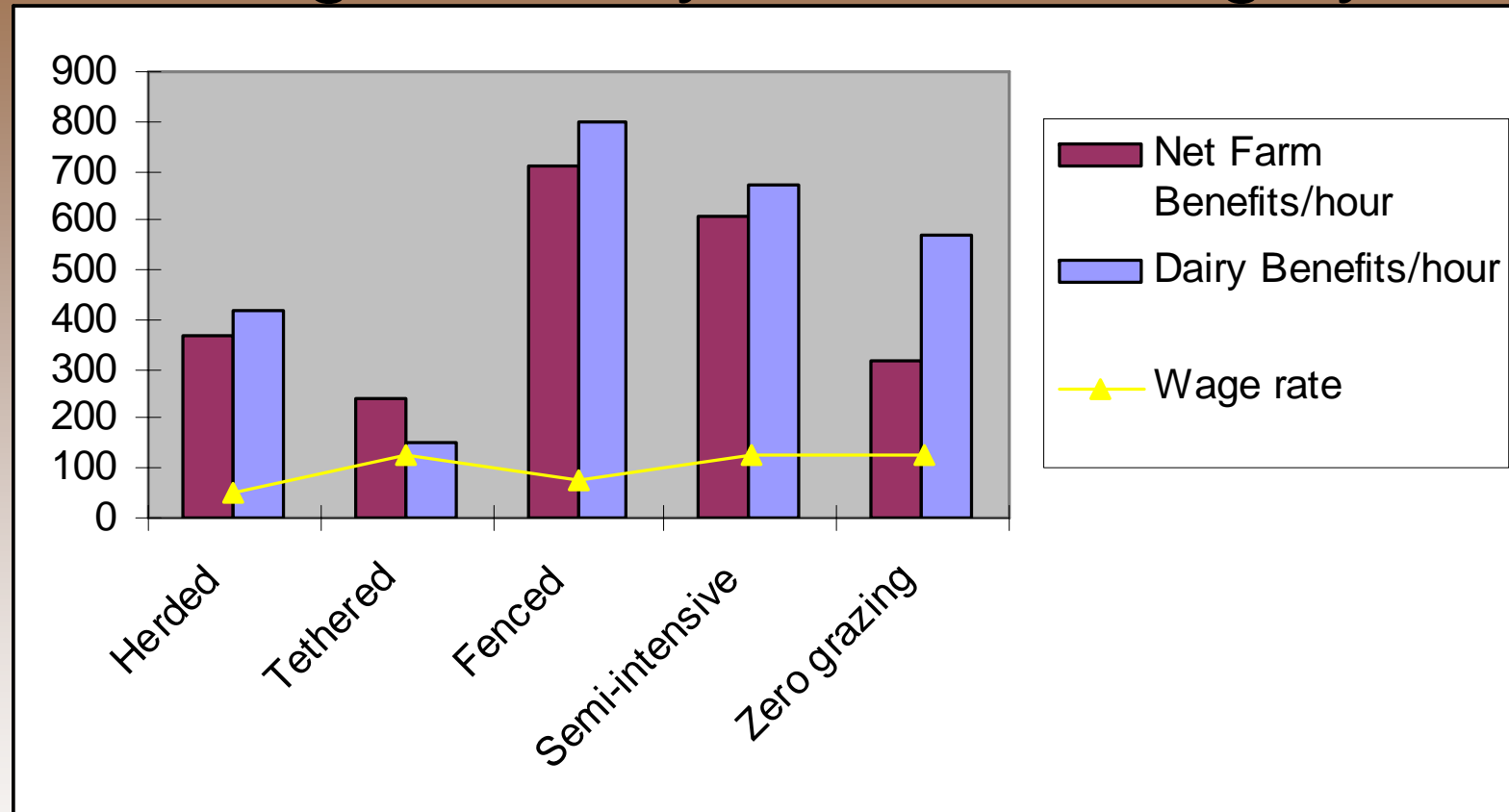
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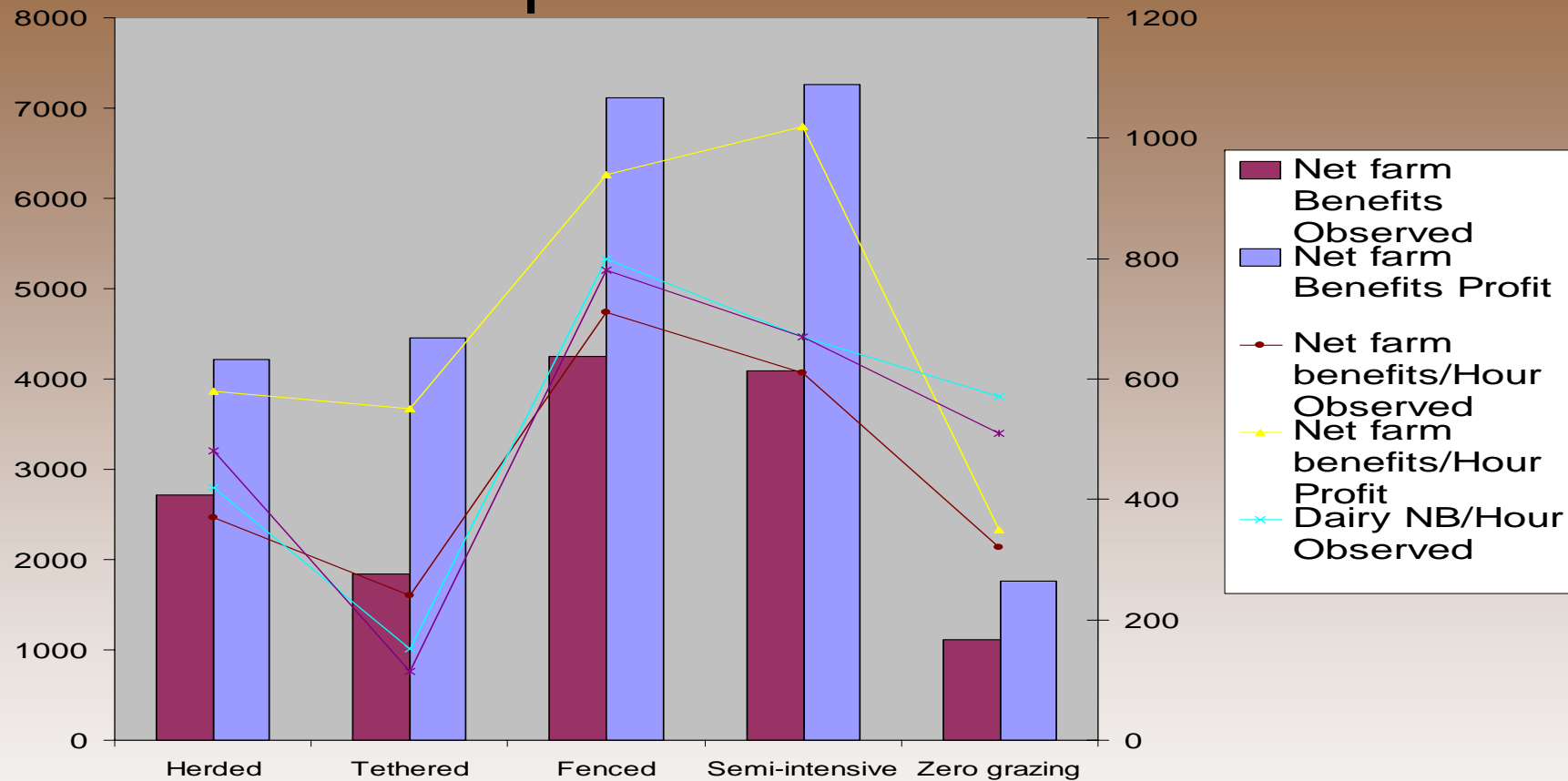
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Net farm and dairy benefits in shillings per hour & wage rate, by cattle farming system



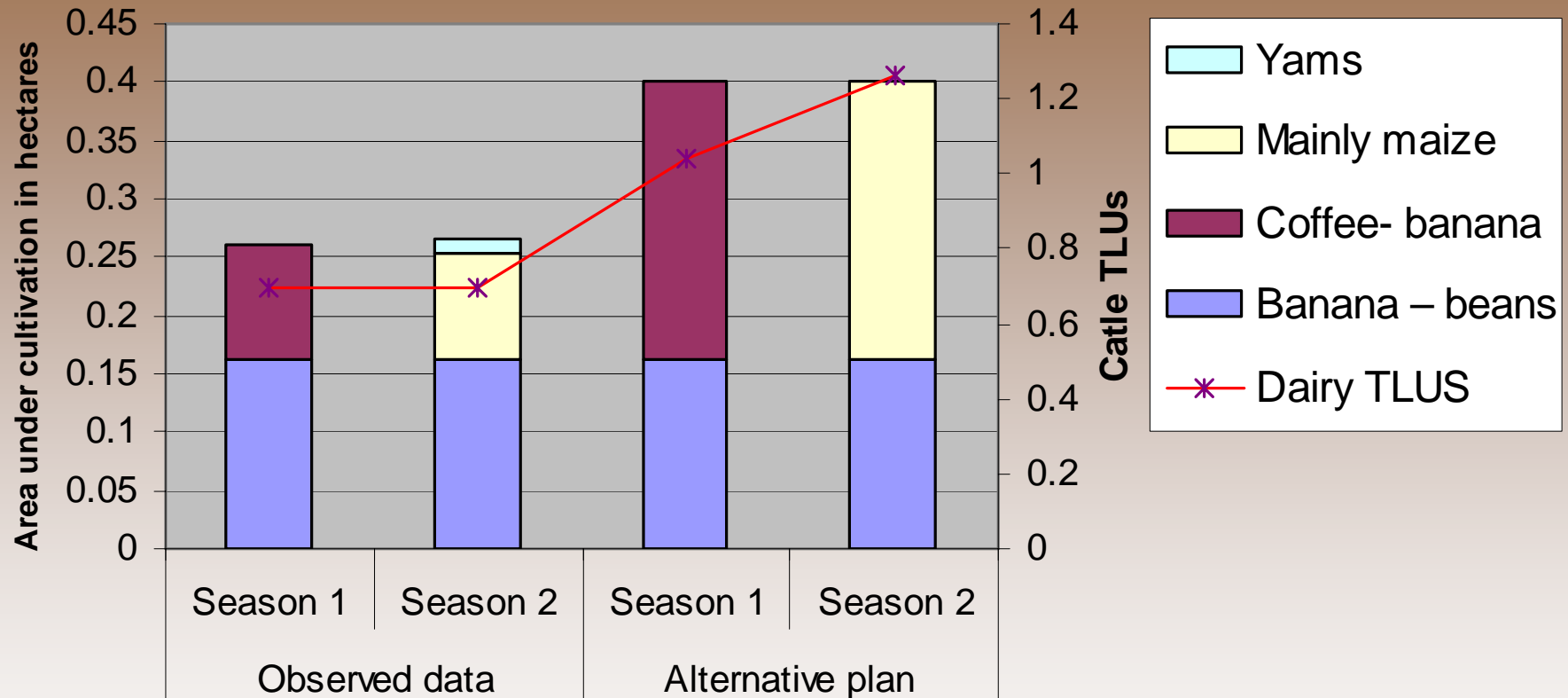
- All dairy systems remunerate farmers' labour above what they could get if they were to sell their services outside their farms.
- The most intensive farms are not necessarily the most profitable ones.

Comparison of farm benefits, observed and from profit maximization



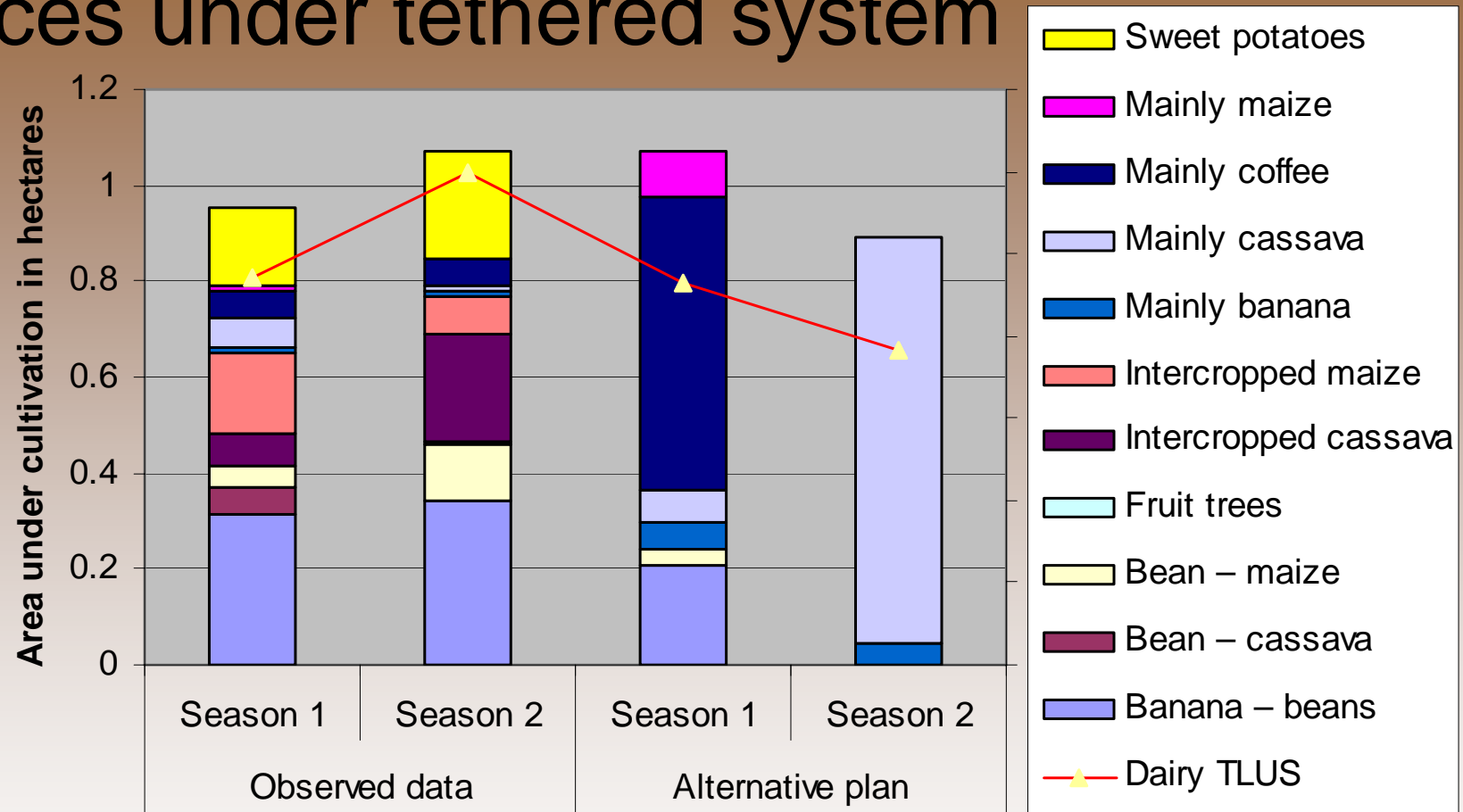
Farmers are operating near the profit maximisation levels for dairy but could improve their overall farm benefits by allocating fallow land to crops and selecting more profitable crop enterprises

Evidence on enterprise choices under zero grazed dairy



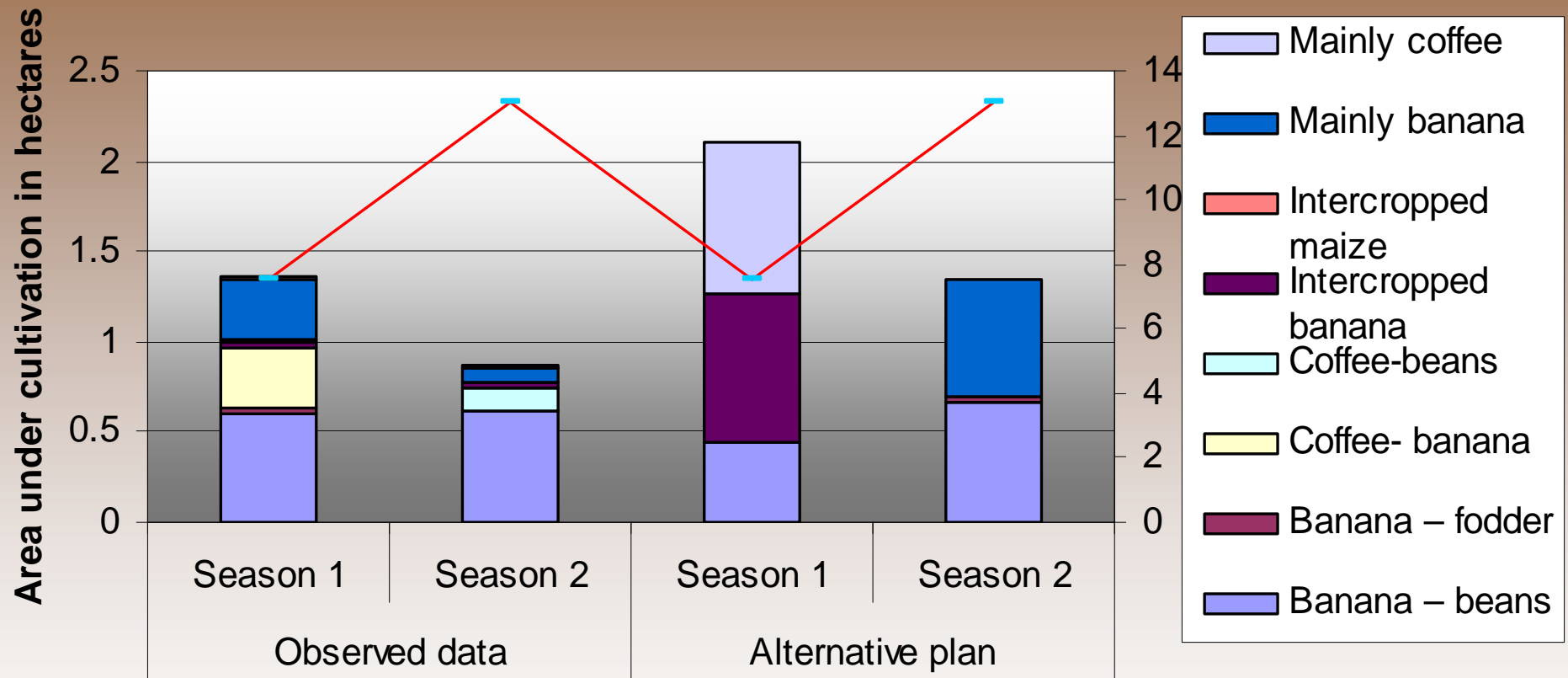
- Profit maximisation plan suggests:
 - More land under cultivation
 - Bigger herds
 - Fewer and bigger crop enterprises

Evidence on enterprise choices under tethered system



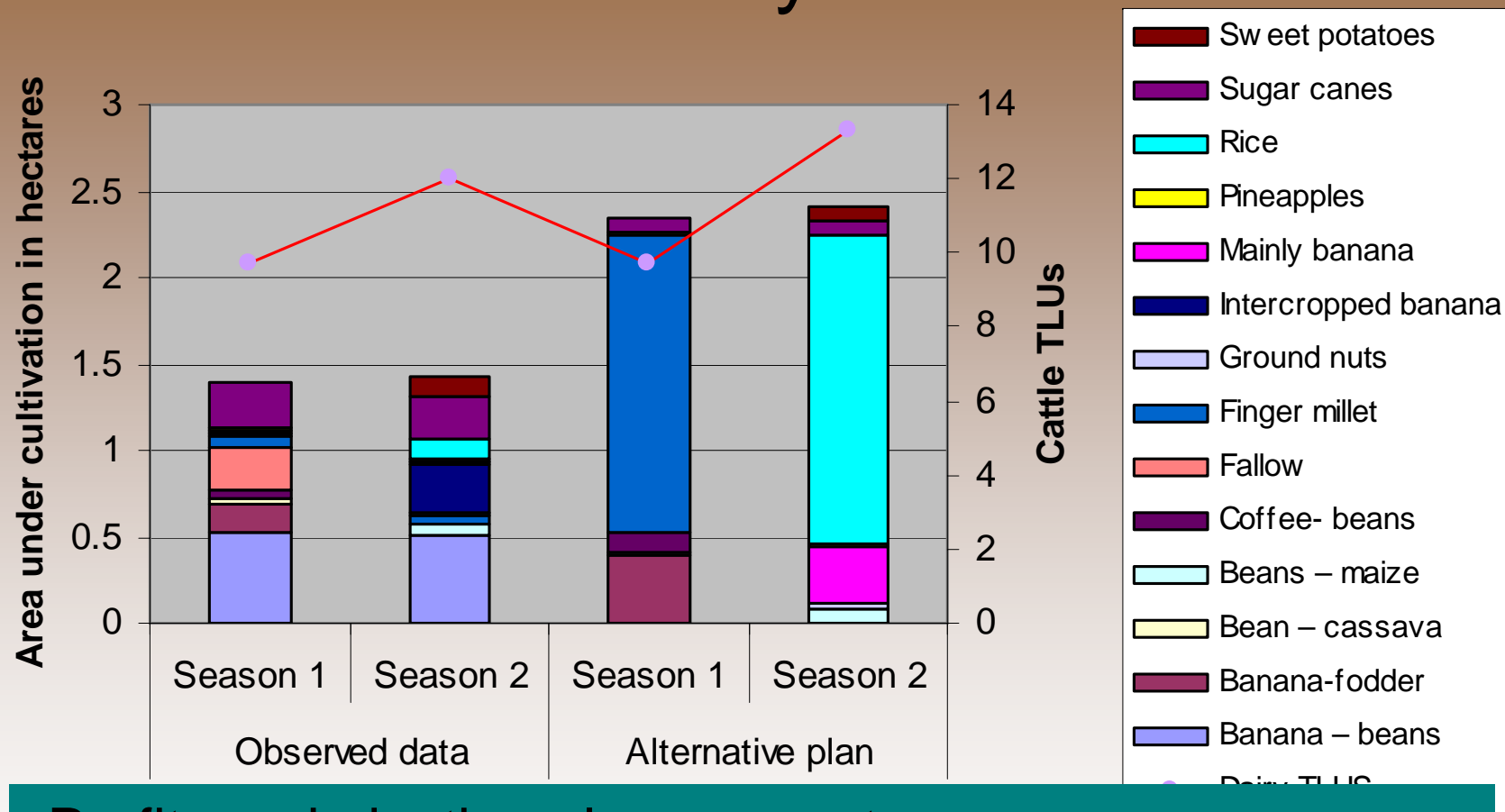
- Profit maximisation plan suggests:
 - Fewer and bigger crop enterprises
 - Slight decrease in herd size

Evidence on enterprise choices under herded system



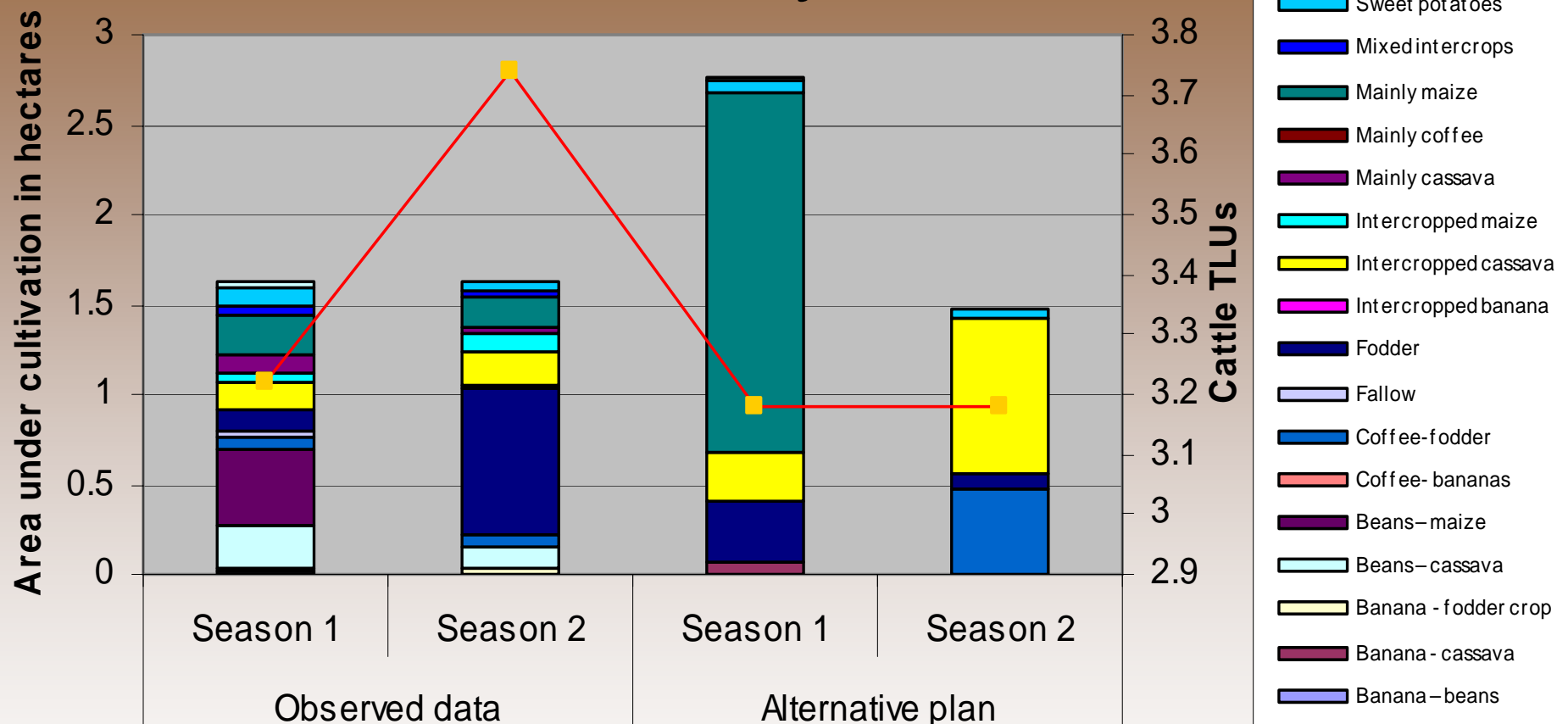
- Profit maximisation plan suggests:
 - Fewer and bigger crop enterprises
 - More land in cultivation
 - Same herd size

Evidence on enterprise choices under fenced system



- Profit maximisation plan suggests:
 - Fewer and bigger crop enterprises
 - More land in cultivation
 - Same herd size, or slight increase

Evidence on enterprise choices under semi intensive system



- Profit maximisation plan suggests:
 - Fewer and bigger crop enterprises
 - More land in cultivation in first season
 - Decrease herd size in season 2

Conclusions

- Dairy production is shown to be profitable and competitive in a variety of settings, where level of intensification suits different local circumstances.
- There is need for targeted interventions to meet area specific conditions and the farmers' resource circumstances, particularly those that place additional demands on the farmers' labour.



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Development of Nutrient Management Strategies along a continuum of Dairy Production Intensification in Uganda



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Use of N, P and K in crop production

- ***Nitrogen (N)***

1. Necessary for formation of amino acids, them building blocks of proteins
2. Essential for plant cell division, vital for plant growth
3. Directly involved in photosynthesis
4. Necessary component of vitamins
5. Aids in production and use of carbohydrates
6. Affects energy reactions in the plant



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Use of N, P and K in crop production

- ***Phosphorus (P)***

1. Involved in photosynthesis, respiration, energy storage and transfer, cell division, and enlargement
2. Promotes early root formation and growth
3. Improves quality of fruits, vegetables, and grains
4. Vital to seed formation
5. Helps plants survive harsh winter conditions
6. Increases water-use efficiency
7. Hastens maturity



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Use of N, P and K in crop production

- **Potassium (K)**
 1. Carbohydrate metabolism and the break down and translocation of starches
 2. Increases photosynthesis
 3. Increases water-use efficiency
 4. Essential to protein synthesis
 5. Important in fruit formation
 6. Activates enzymes and controls their reaction rates
 7. Improves quality of seeds and fruit
 8. Improves winter hardiness
 9. increases disease resistance



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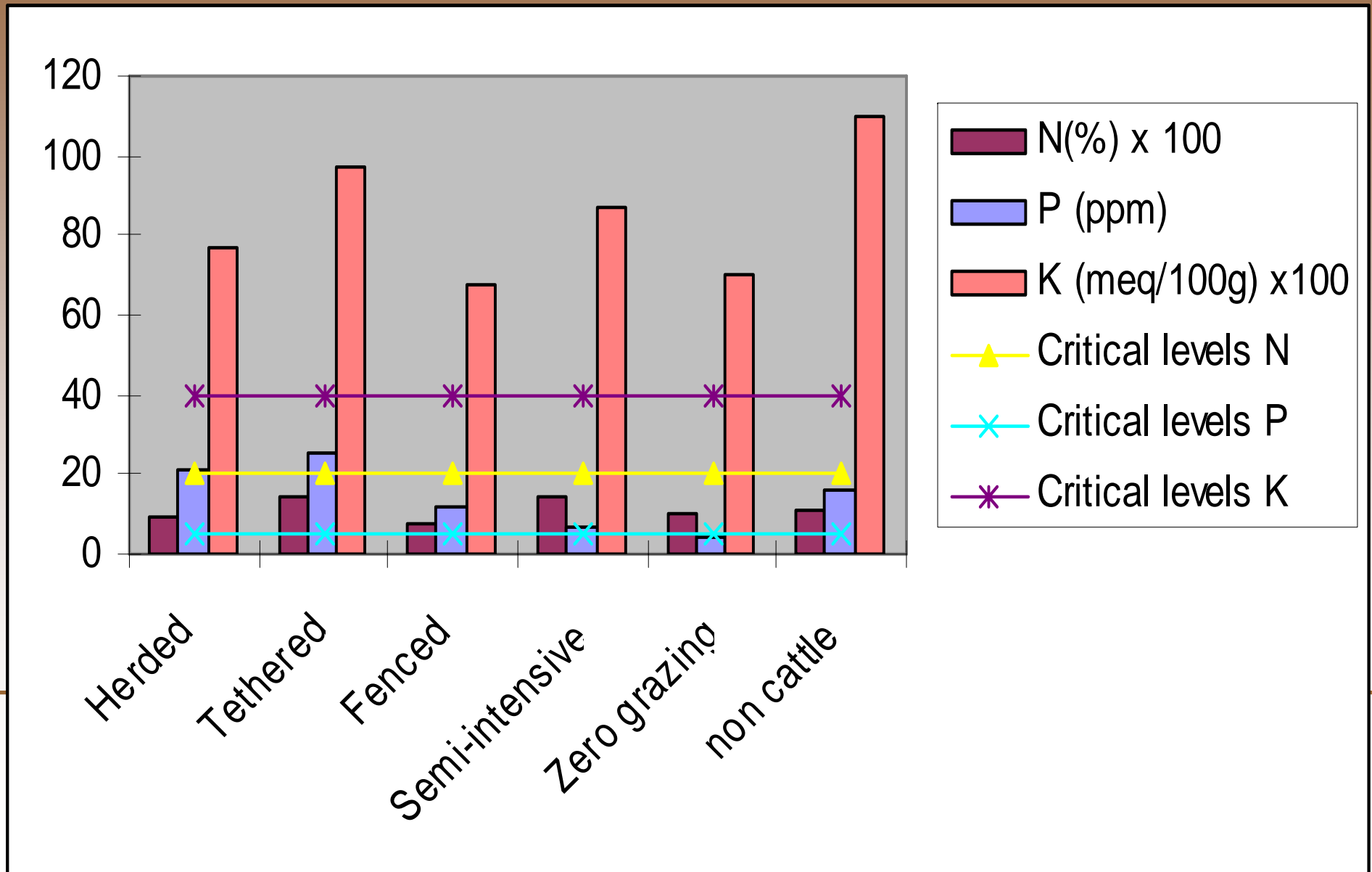
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Quantities of soil N, P and K within dairy farm categories in Uganda and critical N, P and K levels for crop production



Nutrient (N, P and K) Farm & Land balances

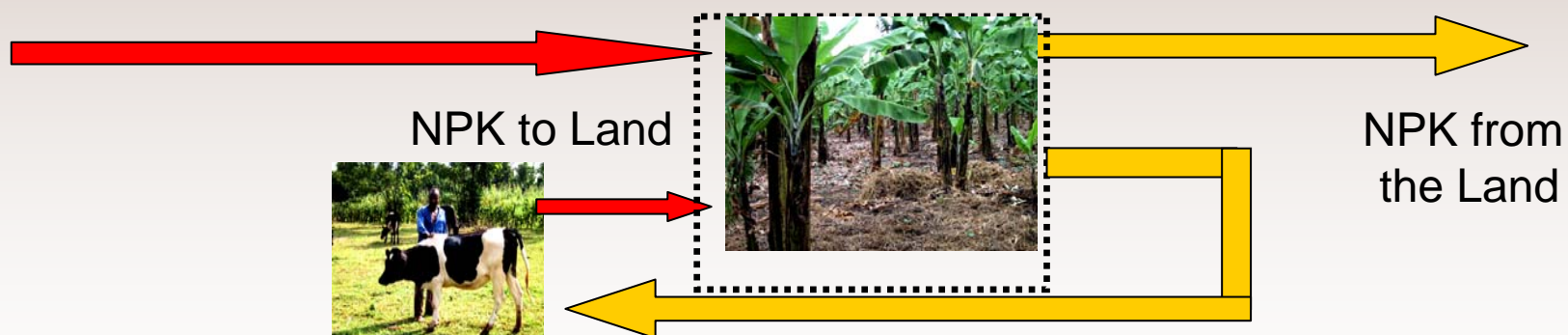
Farm nutrient balance

= nutrients entering the farm – nutrients leaving the farm



Land nutrient balance

= nutrient applied to the land – nutrients removed from the land



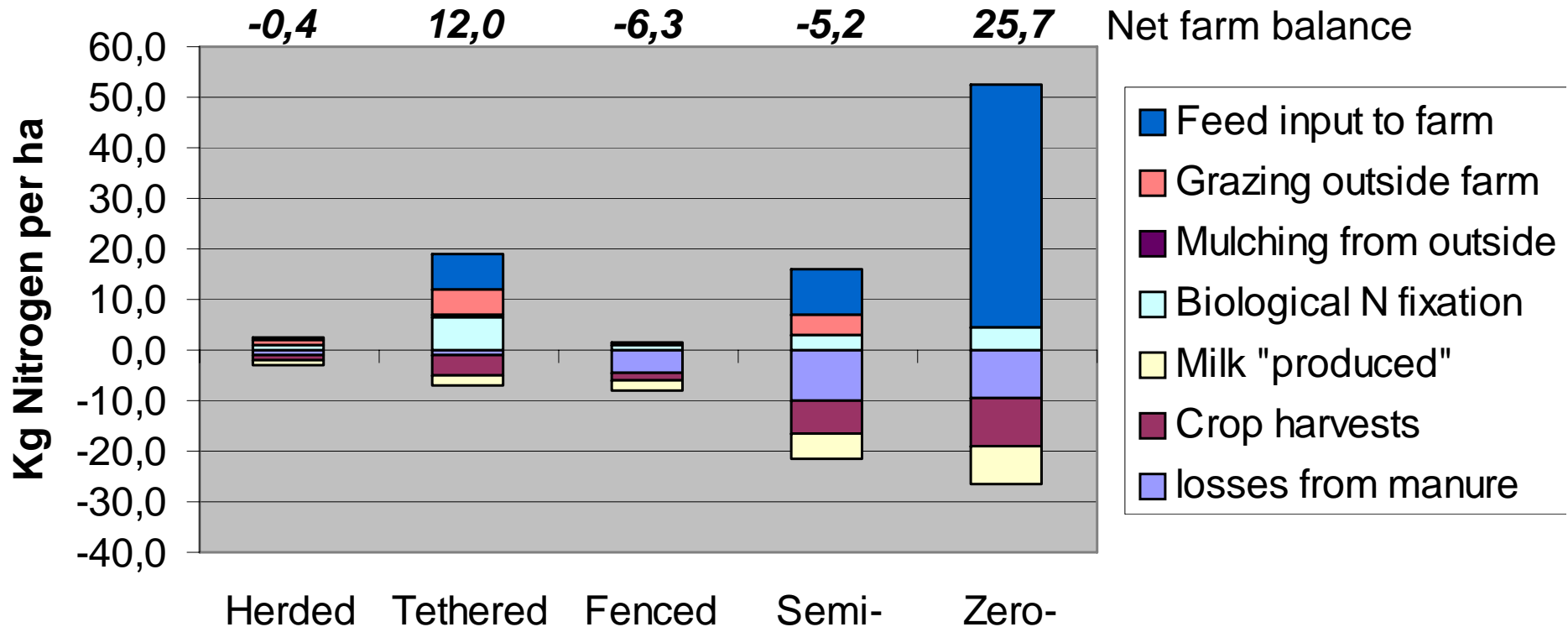
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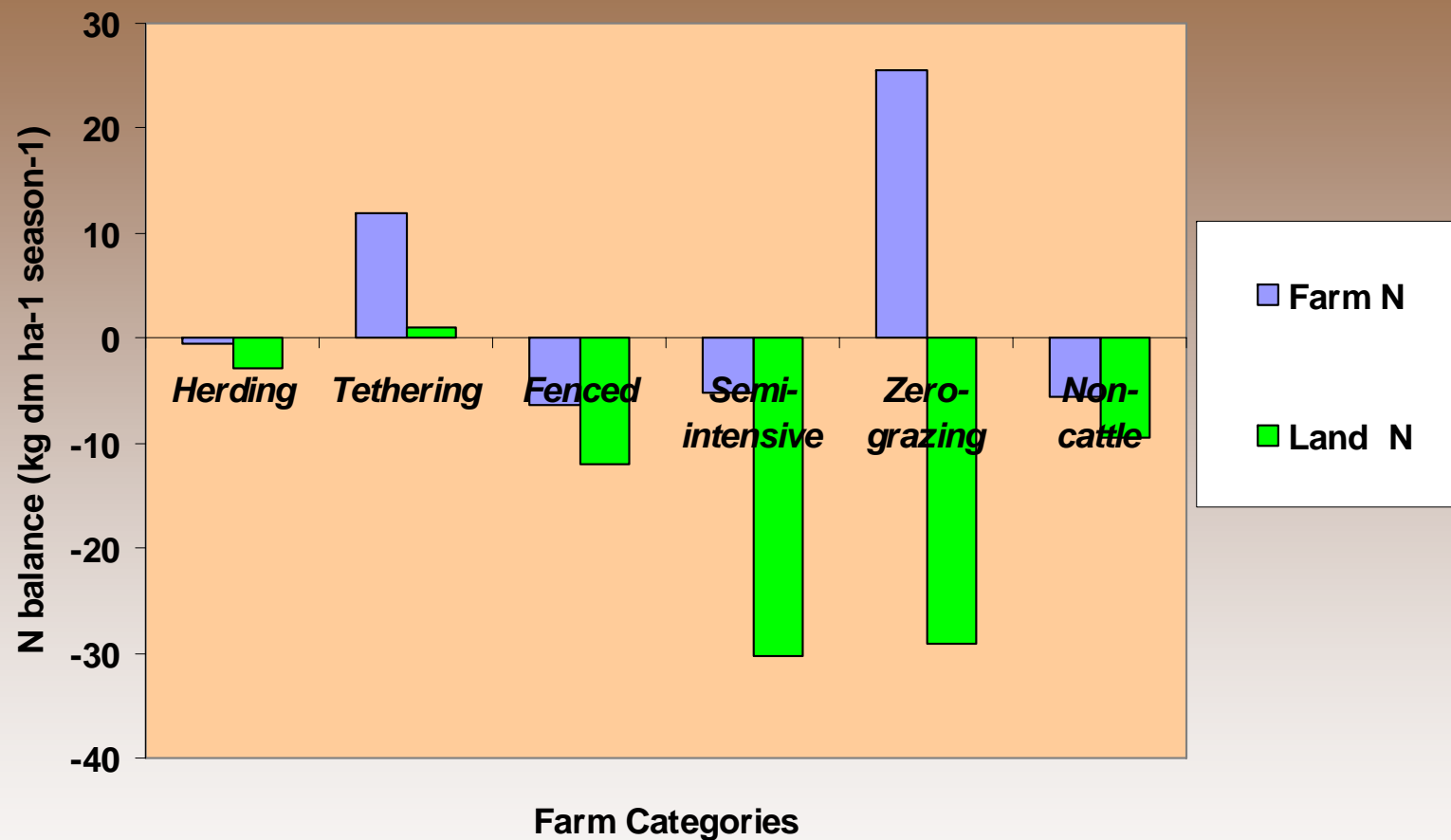
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Inputs and outputs in farm gate Nitrogen balances by farm type



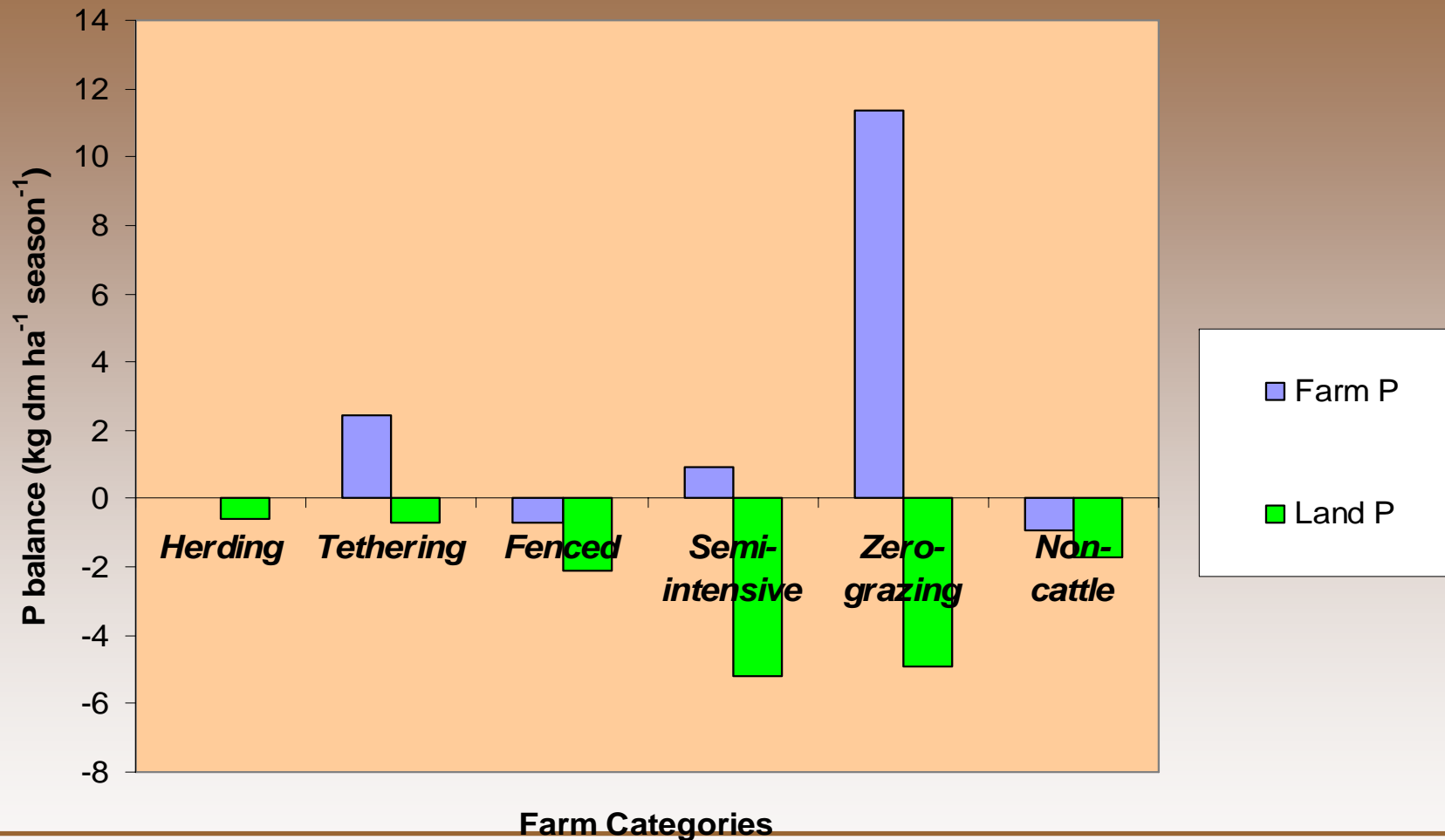
- The zero-grazed system has a high N- input from imported feeds but also the highest output with milk.
- The tethered system has input from both feeds, grazing outside the farm and from N fixation in legumes. This gives a positive farm balance.
- Fenced and Semi-Intensive systems have negative farm balances

Farm & Land *Nitrogen* balances for the different farm categories



The land balances are more negative than farm gate balances because the nutrients in the manure left in the kraal are not applied to the patches

Farm & Land *Phosphorus* balances for the different farm categories



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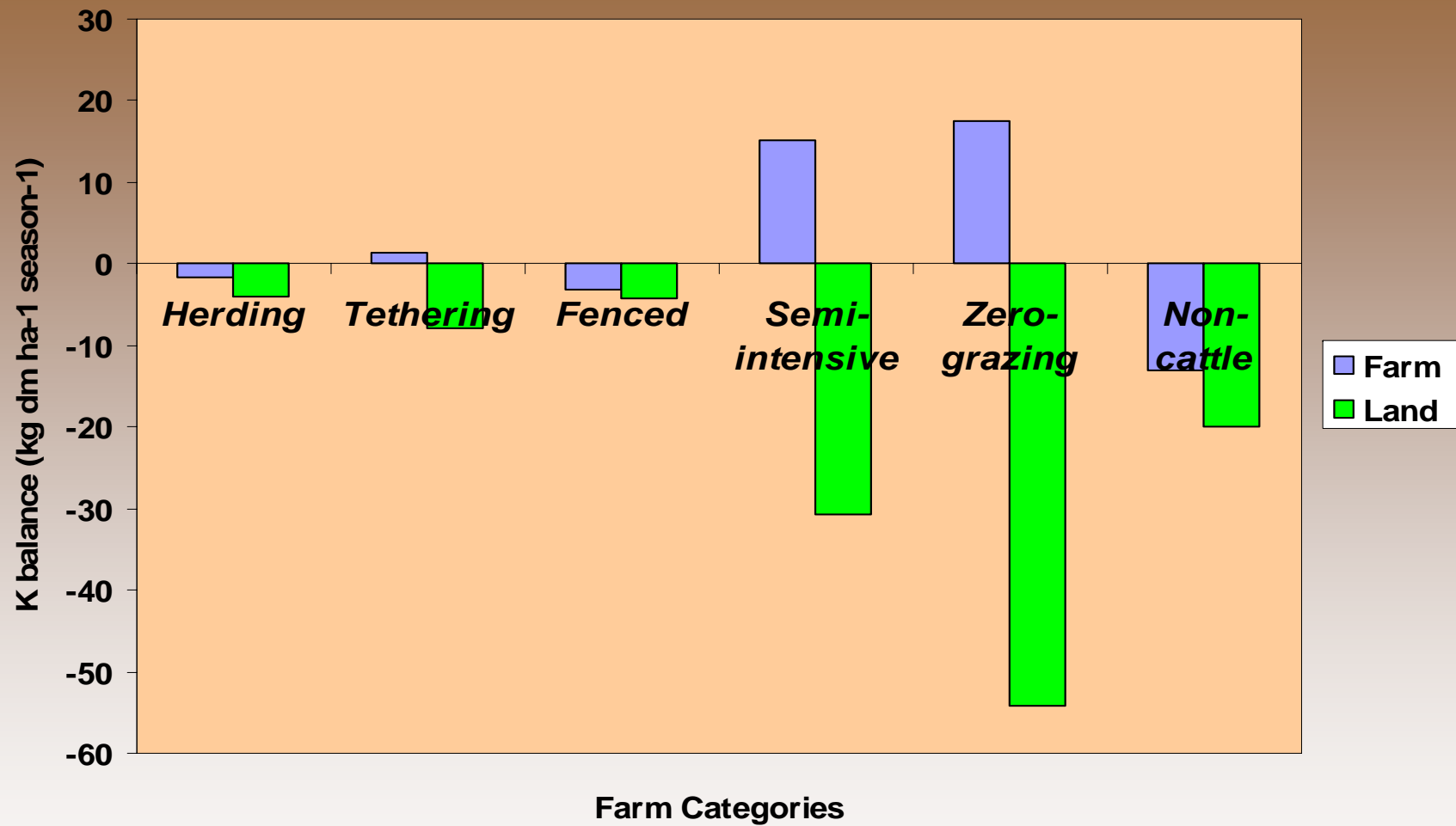
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Farm & Land K balances for the different farm categories



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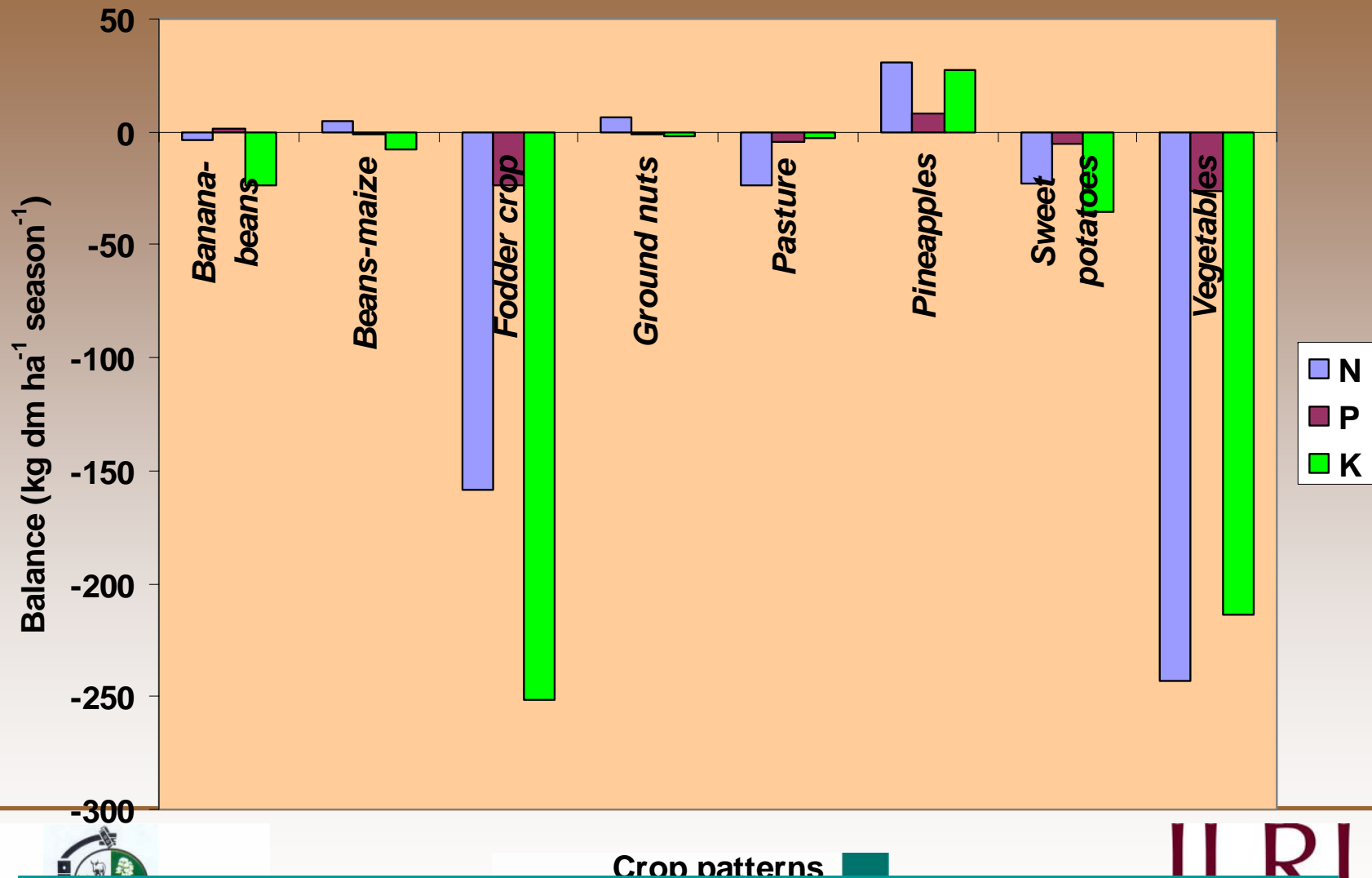
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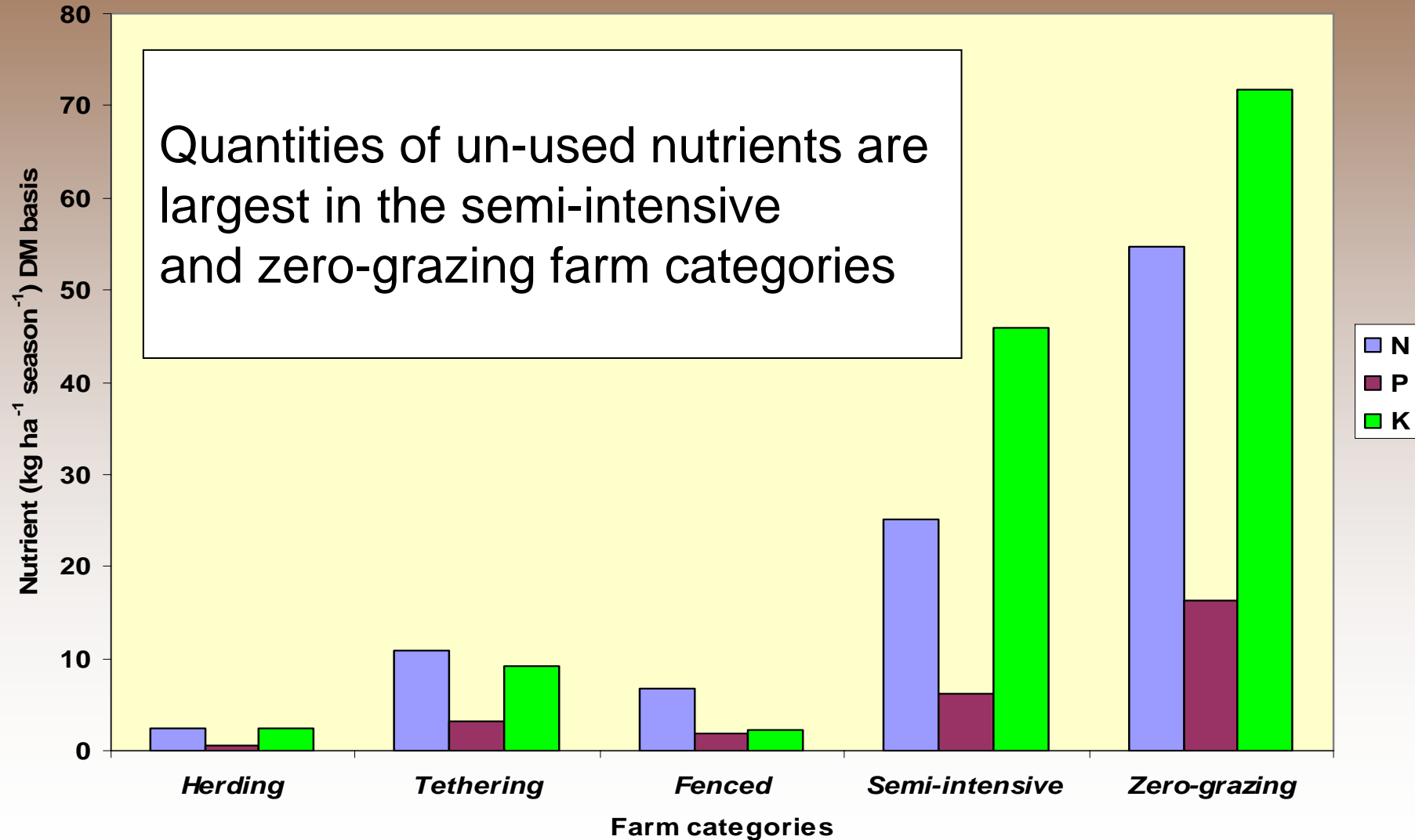
N, P and K balances for Crop Patterns



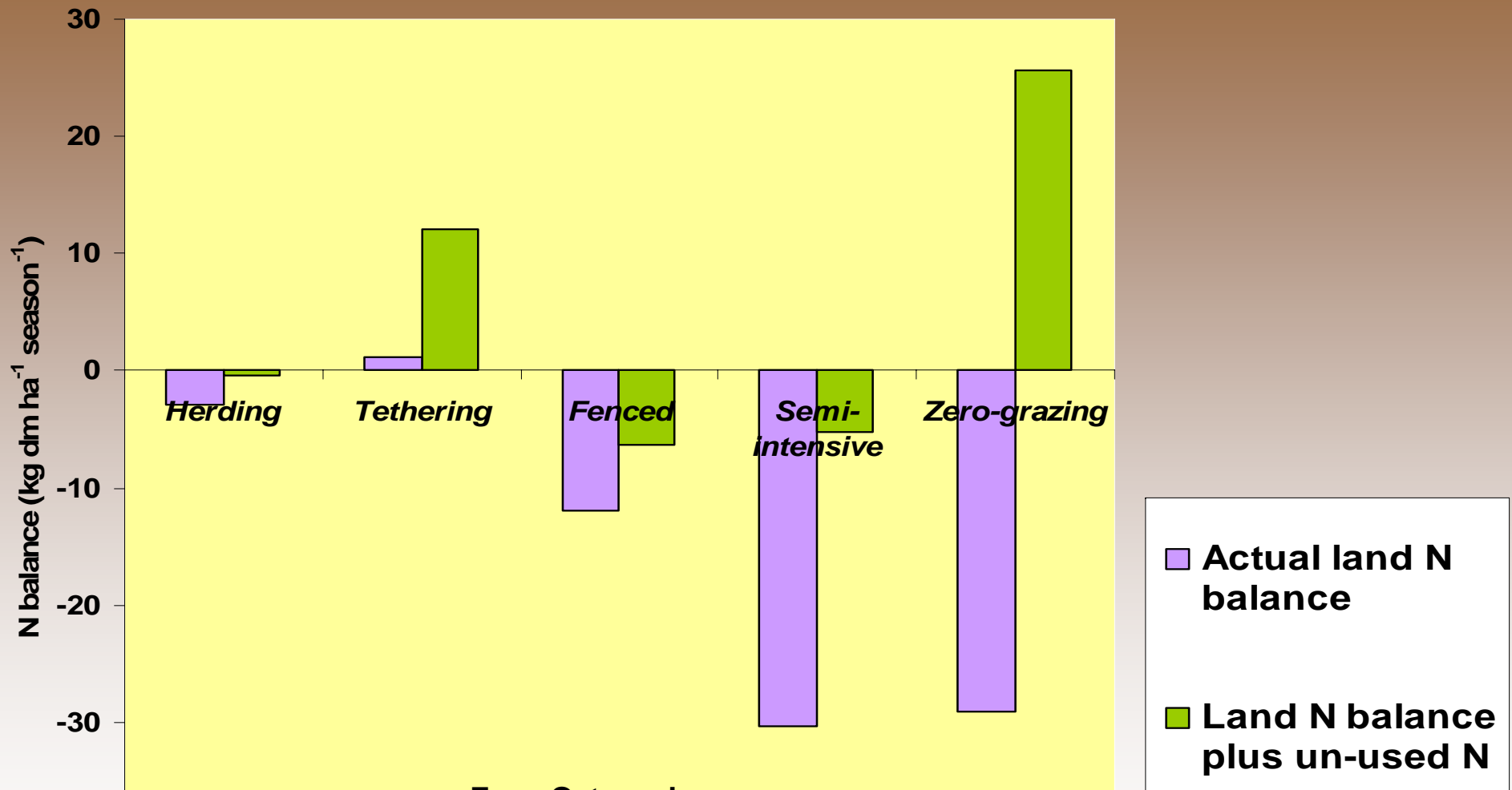
- Fodder crops are the most critical in terms of soil nutrient mining
- Fodder crops mostly found on semi-intensive and zero-grazing



N, P and K in un-used manure in the different farm categories

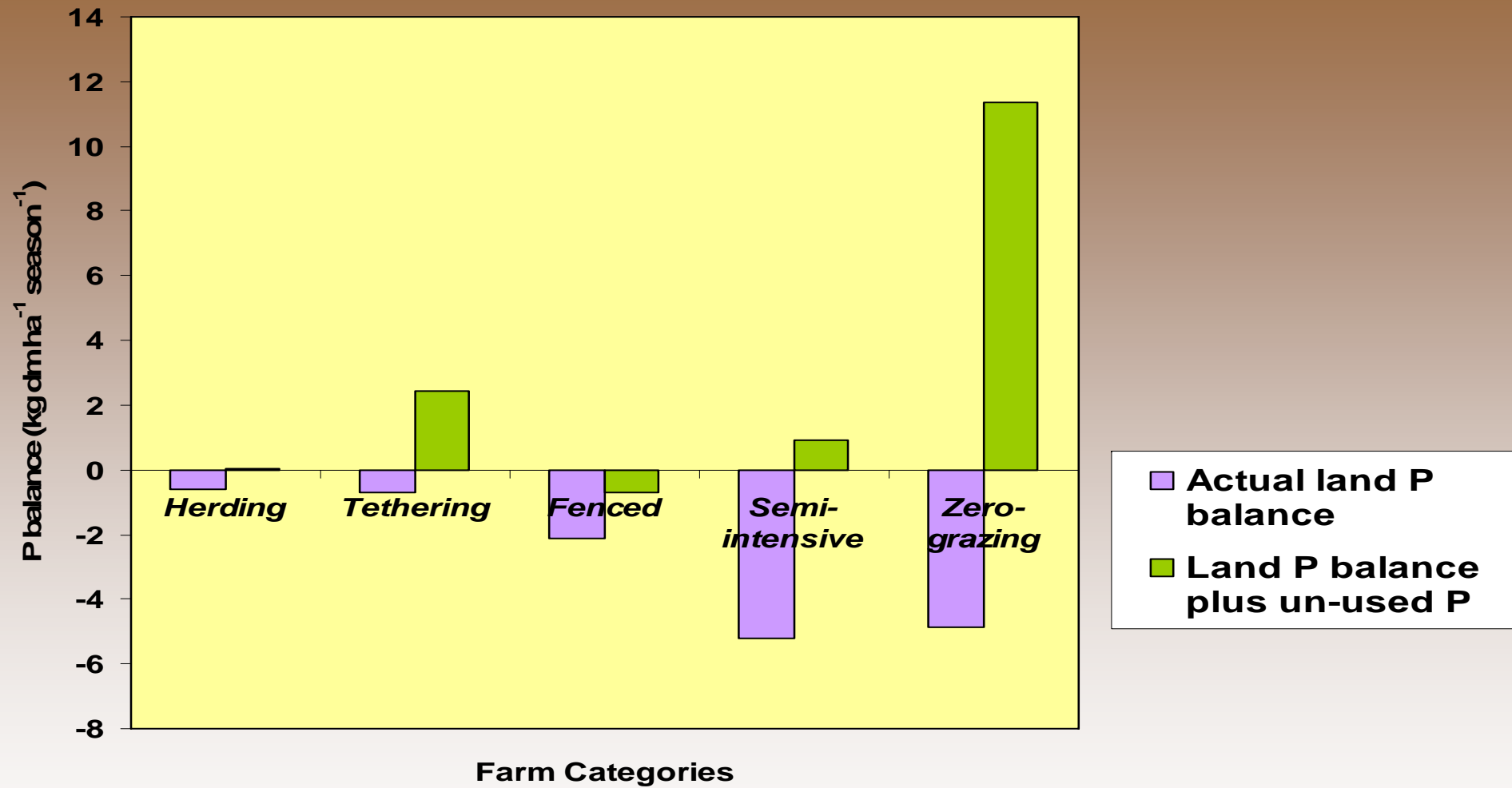


Change in N land balances by applying manure currently not used



- The nutrient mining may be reduced by applying the manure from kraals to land (patches)
- Fenced and Semi-intensive would still need N-input from outside farm to attain zero balance

Change in P land balances by applying manure currently not used



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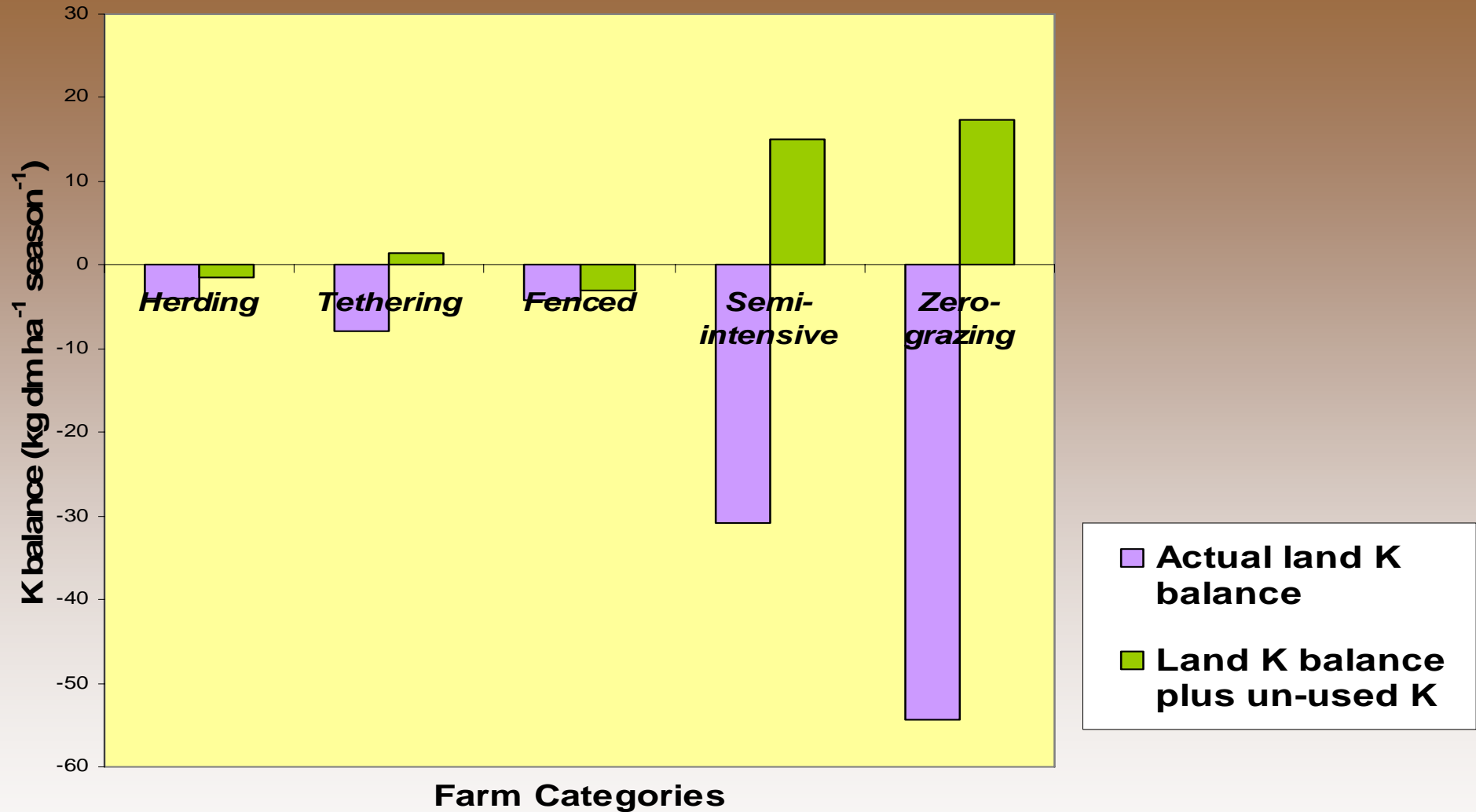
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Change in K land balances by applying manure currently not used



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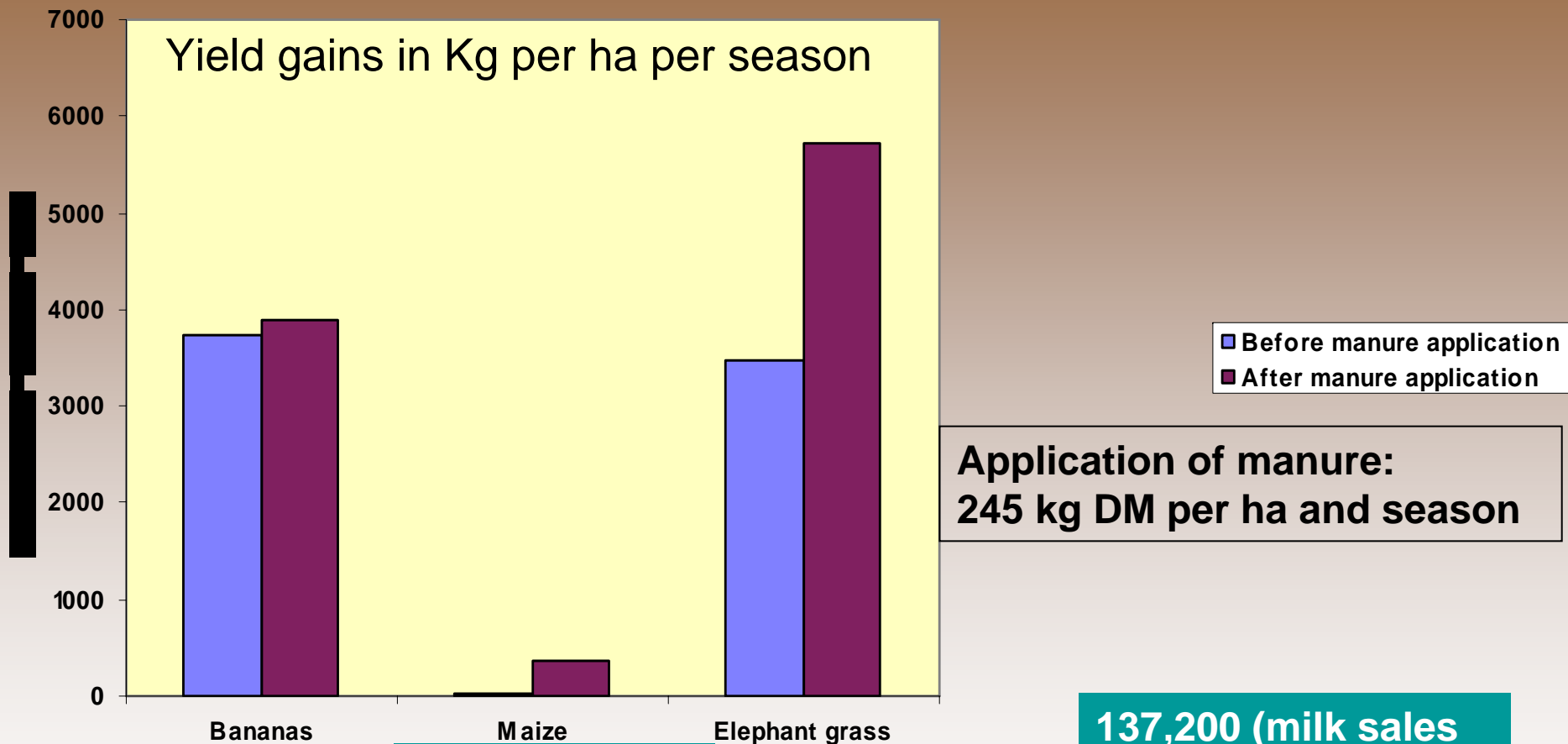
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Factors used in yield estimates

Bananas	Maize	Elephant grass
Manure applied	Soil Nitrogen	Soil potassium
Crop residues	Manure applied	Manure applied
Season	Crop residues applied	Crop residues applied
District	Terrain of the land	Grain legumes in the area
Silt in soil	Number of crops in the mixture	Area in relation to total land area
Area in relation to total land area		

Differences in crop yields per ha between patches with and without manure supply.



**Income gain:
91,228 Ushs
(30 kg bunch
costing 4000
Ushs)**

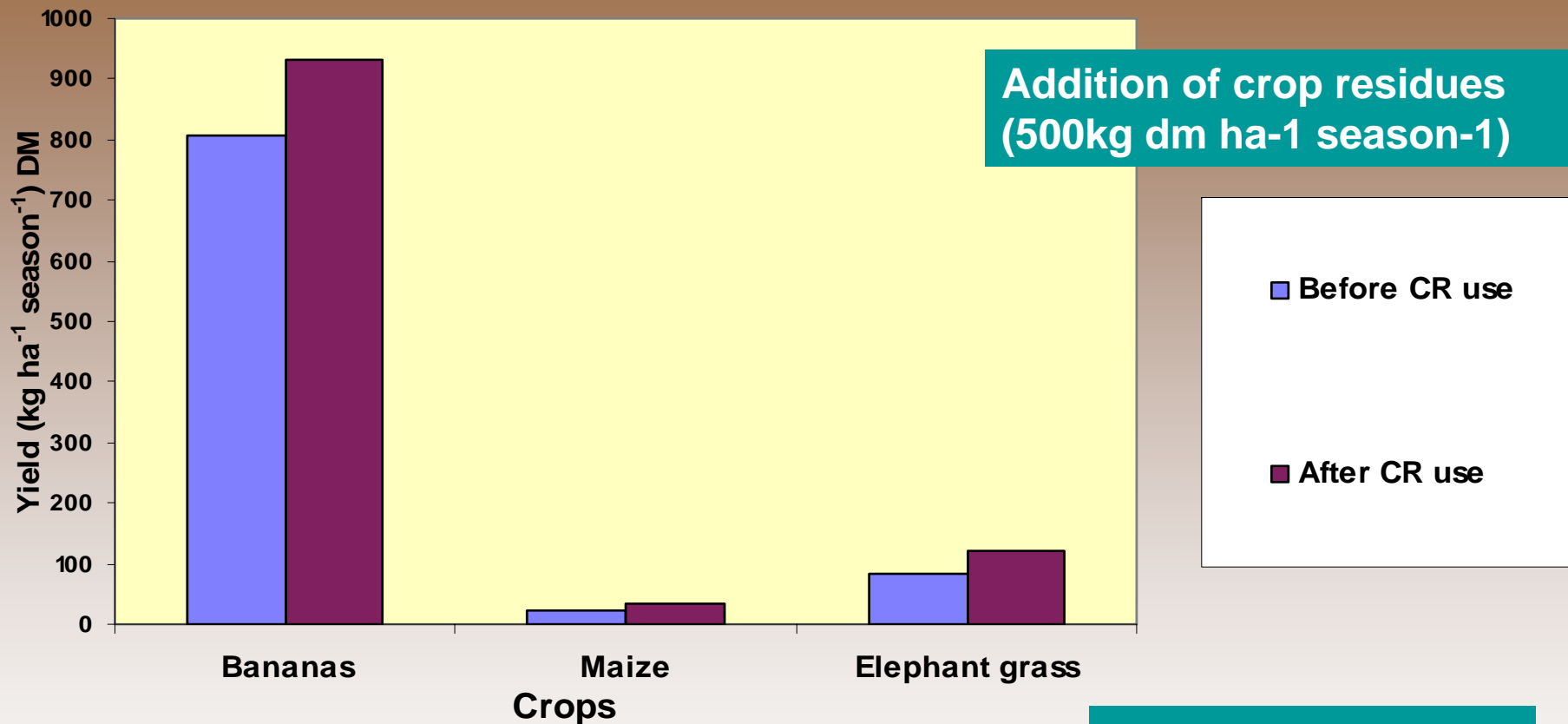
**Income gain:
84,250 Ushs
(Maize= 250
Ushs per kg)**

**Income gain:
334,820 Ushs
(bundle sales)**

**137,200 (milk sales
in Mbarara)
274,400 (milk sales
in Masaka)
343,000 (milk sales
in Jinja)**



Yield differences in selected crops between patches with and without crop residue application on smallholder dairy farms



**Income gain:
79,100 Ushs
(30 kg bunch
costing 4000
Ushs)**

**Income gain:
3000 Ushs
(Maize= 250
Ushs per kg)**

**Income gain:
18,300 (bundle
sales)**

**7500 (milk sales in
Mbarara)
15,000 (milk sales in
Masaka)
18,750 (milk sales in
Jinja)**



Conclusions

- N, P & K land balances are much lower than farm balances. Thus within the zero-grazing & tethering farm categories land balances can be increased to positive levels when all the farm manure is utilised.
- Fodder fields are largest source of nutrient mining. Larger quantities of manure would need to be applied to fodder fields to rebalance nutrient levels.
- There is potential for increase of crop production through soil improvement with manure & utilisation of crop residues.



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Farmers Feedbacks



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Questions that were asked- economic issues

1. Based on your knowledge of dairy do the five systems presented today represent the situation on the ground?
2. In your opinion, what factors make farmers choose one system over another (e.g. tethered instead of zero-grazed)?
3. What would you consider to be the advantages and disadvantages associated with the different systems?
4. Research shows that profit plans offer higher observed farm benefits; what inhibits farmers' adoption of the profit plans?



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Why not adopt the profit maximisation plans?

- Lack of knowledge
- Lack of capital
- Avoid risk
- Cultural norms
- Age and health of farmers
- Gender roles
- Marketing of commodities
- Lack of farmer groups



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Questions that were asked- nutrient management issues

1. In your experience, do you see a decline in soil fertility?
2. If yes, what factors do you think are responsible for decline in soil fertility?
3. Why is manure only applied in small quantities to crop fields?
4. What other options do you have for improving soil fertility (rank them)?
5. Are you using these methods? If not why?
6. What do you think of the soil fertility improvement options presented?



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Nutrient management and soil fertility

1. *In your experience, do you see a decline in soil fertility? Yes!!*
2. *If yes, what factors do you think are responsible for decline in soil fertility?*
 1. Lack of manure application
 2. Ignorance of value of manure application
 3. Poverty in the region;
 4. Soil erosion is washing away the loam soil from the gardens
 5. Deforestation causing removal of trees which would have helped in reducing soil erosion and increasing soil OM through leaf fall
 6. Over grazing due to extreme land limitations
 7. Land fragmentation leading also to over grazing and excessive land use



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Why is manure only applied in small quantities to crop fields?

1. Some lack manure
2. Some lack knowledge
 - The value of soil fertility management
 - Some fear manure harbour pests especially banana weevils
3. Lack of facilities such as wheel barrows and bicycles to move the manure to the gardens
4. Labour constraint: These jobs tend to be left to women who lack time to apply the manure



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What do you think of the soil fertility improvement options presented?

- It is possible to improve soil fertility management, but
 - Lack of knowledge on how to do this
 - Require money to effect some of these soil improvement methods
 - Require labour and/or time



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Questions for Group Work

- To what extent do you agree with the conclusions presented today, and why?
- What extra knowledge do we need in order to confirm these results and take action on the messages?
- To what extent do you find that these results should change the current development strategies and extension messages, both public and within NGOs and other organisations?
- If yes, how?

Please choose a facilitator and a presenter in each group!



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Intensification of smallholder Dairy farming in Uganda

Stakeholders workshop, 26th April 2006

Notes from discussions

Questions to William's presentation on economic results:

1. Some development organisations promote the intensification of dairy farming irrespective of circumstances, but it is not always appropriate. "Send a cow" initiatives are not always good. So this study is very useful to make people understand these issues (Peter Lusembo, Mukono ARDC)
2. Profitability of dairy in the 3 districts, in which districts is it more profitable?
 - a. Although we had districts, we didn't calculate average by district. Zero grazed are mainly from Jinja etc., so systems are somehow comparable to districts. In all farms, the net benefits are positive. Irrespective of the management system, there is a positive benefit.
 - b. Is it fair to tell farmers whose market situation does not allow high input management to go for high breed cattle? The answer is no.

Questions to Sarah's presentation on nutrient balances:

Q & A

3. Semi-intensive and fenced dairy systems have negative balances, why?
 - a. Because few nutrients are imported in these systems; even if manure is being applied it's not enough, need for imported nutrient either fertiliser or feeds.
4. Labour and transport cost prevent farmers from using manure- so why not purchasing fertiliser
 - a. We haven't done the calculations using fertiliser versus using manure. This issue was discussed yesterday during the farmers' feedback. And there are some farmers with close by plots who do not use manure, so need for more sensitization

10: 25- 10: 45 Farmers' feedback

Q&A to presentation of farmers feedback

1. In Mbarara some dairy farmers give up farming. At the same time, farmers are asked to continue farming. Which recommendations from this project could be given so that farmers are advised on a farming system that they can do?
2. RE. use of manure: I have started to use the cowmanure as feed for poultry and piggery. She's encouraging other farmers to feed manure as feed (Jolly Kabirizi, NAARI)
 - a. Might be a good idea, but even if cow-manure is used as feed, farmers will still get manure from the animals that are fed. So the need to bring manure

nutrients to the land does not disappear, only the recycling becomes more complex!

3. Livestock feeding component is missing. In the past, feeding management components were included in other studies because it's important.
 - a. No, we included the feed use, both imported and home-produced feed and fodder in the analyses, and this is shown –among others - in one slide presenting the relative importance of feed import to the farm vis-à-vis other Nitrogen inputs. Actual testing of fodder production and use was not part of this particular study, since this has been done in other, related research.
4. Nutrient balance analysis. If farmers carry nutrients from the forest and swamps for mulching etc. as is recommended widely, do we then mine these areas? How do we ensure good nutrient balances there?
 - a. No, this might be a good idea, because there is a large loss of nutrients from the farms in the hilly areas through leaching and erosion, Thus, on a wider scale there is a recirculation of nutrients from the farms to the swamps and forests.
5. Some farmers use manure as source of firewood and house construction so there's another loss of manure
6. (P. Lusembo) need to better understand farmers' behaviour.

Cyprian's comments:

- Now in Mbarara, more HF and less Ankole than before
- Missing gaps in the model: cattle cycling/ feeding
- William's conclusion: dairy is profitable. Can the model be a decision support tool for the farmer to choose the best alternative?
- 3 key big problems
 - Issue of land and land use
 - Issue of pop growth
 - Issue of marketHow do we move forward in these 3 areas?

William

- Mbarara: giving up dairy but not completely. They don't upgrade anymore since these animals need a lot of feeds; given low milk prices, they decide to "degrade". In the zero-grazed system, the same has been observed. After the development agents have left and who advocated that system, the system is paddock based since labour constraints and costs are high. So out of experience, farmers go from more to less intensive system.
- Decision support tool: under profit maximisation, less crops but bigger areas. So the current model does give some "advice"

Sarah

- Nutrients taken out of the forests- these areas are not under cultivation but fallow. So these are areas where nutrients are being built up.
- Need to take advantage of the crop residues and kitchen waste otherwise they get wasted

(NAADS coordinator Mbarara)

- On nutrient??
- Dairy- there's profit but how much profit do the farmers make? Not enough for children education. Importance of the marketing part of the dairy sector. Need to better understand the marketing issues.

Animal feeding along continuum: is that missing from the project? Sarah answers by saying that this project was not focused on this aspect. However, in the farm balance, there is a graph showing the contribution from the feed input into the farm, that is nil in 2 systems, herded and fenced but exist in the other systems (Niels). William clarifies also what was done in the LP model regarding cattle feeding (feed requirements and constraints were included in the model).

Cyprian:

- need for an in depth analysis of marketing system
- No uniform prescription in terms of intensification. The government has already done some "zones" and how this project can help in the zones that have not yet been covered?

Peter N: policy implications, decentralization and involving farmers and private sector into research process. And this has been included in the PMA.

Reports of group work:

Group work led by Niels,

Four groups were established, all trying to answer the questions below. Two groups focus on the economic analyses and two groups were asked to focus on the nutrient balance analyses.

Questions:

- *To what extent do you agree with the conclusions presented today, and why?*
- *What extra knowledge do we need in order to confirm these results and take action on the messages?*
- *To what extent do you find that these results should change the current development strategies and extension messages, both public and within NGOs and other organisations?*
- *If yes, how?*

Group work starts at 12.05, Back to plenary at 13.00

Economic issues

Questions	Group 1	Group 2
<p><i>To what extent do you agree with the conclusions presented today, and why?</i></p>	<p>Do not entirely agree because</p> <ul style="list-style-type: none"> • profit depends on production systems, but it is generally low • Does size of farm matter? • sample size looks small and may not adequately give a true reflection • Not sure how breed differences were accounted for 	<p>Do not entirely agree because</p> <ul style="list-style-type: none"> • Constant load shedding in the country today has changed the economic landscape. • We have to compare region taking into consideration the price of milk and the farming systems used in each of the different areas, and not forgetting other factors like the availability of land and cost of inputs plus the market accessibility.
<p><i>What extra knowledge do we need in order to confirm these results and take action on the messages?</i></p>	<ul style="list-style-type: none"> • need to know profitability by district (would add value to the zoning exercise) • Actual cost of producing per litre of milk not available 	<ul style="list-style-type: none"> • We have to know the cost per unit of production in various dairy production systems. • We also need market chain planning and analysis in the various milk producing regions. • Price and cost of distribution (transport and transaction costs).
<p><i>To what extent do you find that these results should change the current development strategies and extension messages, both public and within NGOs and other organisations? If yes, how?</i></p>	<ul style="list-style-type: none"> • Cannot generalise • Extension message should be given with a deep understanding of the farmers' circumstances 	<ul style="list-style-type: none"> • Our interventions should be based on adding value to what methods farmers are currently applying then trying to change them (because farmers have reasons why they apply their particular methods) • Assess the methods farmers are using. Improve on them and guide them to produce better yields. • Assist them to adapt to changing market conditions through monitoring the markets.

		<ul style="list-style-type: none"> • Train the farmers to use what they already have on the farm to be able to produce or make their own manure • Work hand in hand with the already existing groups like NAADS and PMA who are dealing with farmers to be able to access the constraints and help when necessary.
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Nutrient management issues

Questions	Group 1	Group 2
<i>To what extent do you agree with the conclusions presented today, and why?</i>	The potential to increase crop production exists with dairy farming	<p>We agree to some extent:</p> <ul style="list-style-type: none"> • Manure is available • Some dairy systems are less laborious-promoted • Advice on night paddocking • Bring animals near home/gardens part of the day (herding systems) • Deeper understanding/advice on net benefit of dairy farming to all household member • Manure is the cheapest fertiliser • Rotate grazing with cultivation
<i>What extra knowledge do we need in order to confirm these results and take action on the messages?</i>	<ul style="list-style-type: none"> • The constraints other than labour include those mentioned by the farmers eg lack of awareness and alternative uses of manure. • The cost of organic manure vs. inorganic manure should be established. • Economic, social and environmental benefits of the alternative should be known. 	<p>Knowledge on the following degrading effects:</p> <ul style="list-style-type: none"> • Soil erosion and run off • Exposing manure directly to sunshine • Proper stocking rate • When and how much manure to apply • Decomposition techniques which are easy • Educate/sensitise on manure no immediate

	<ul style="list-style-type: none"> • The results presented don't seem to have looked at farmers who are using manure • Economic and social cost implications of alternative processing methods (organic vs. inorganic) • Social factors that should be addressed include attitude, health, gender roles, etc. • The linear programme in the economic efficiency should be applied to the nutrient recycling as well. 	<p>effect (long term investment)</p> <ul style="list-style-type: none"> • Composition of manure • Decomposition and manure application should be done in holidays when children are home • Exploit organic products though incentives
<p><i>To what extent do you find that these results should change the current development strategies and extension messages, both public and within NGOs and other organisations? If yes, how?</i></p>	<ul style="list-style-type: none"> • The results obtained should be used to refine the enterprise zoning concept • The results of this study should go beyond farming systems to specific farm situations 	<ul style="list-style-type: none"> • Feasibility studies –market and profitability (situational) • Bridge gaps eg. Applications knowledge • Localised demonstrations (specific methods and results)

Other comments- Peter Lusembo chairing

a. Manure:

- did we find difference in manure quality by areas?
- Purchase manure? Is it common?

Answer by Sarah: group work to get a more consolidated answer. We didn't take into account manure quality, but we are aware that manure quality is function of the feed given to cattle. Regarding manure market, during the characterization survey, we did encounter farmers buying manure. In the longitudinal survey, no hh bought manure but some bought mulch.

b. Profitability:

- a. One participant thinks smallholder dairy farming is not profitable. The industry is operating under capacity. Due to hand milking, milk stay in the cow.
- b. Labour cost needs to be accounted for
- c. Since farmers do not do silage, under feeding during dry season
- d. Spillage, a lot of losses at processors units

Answer by William:

- Profitability by district: it is possible to get the data, we will do it
- Cost of production: yes we can give the figures.
- Breed: breeds were accounted for in each system.
- Sample size: 300 hhs for characterization, then farms were subjected to PCA and cluster analysis to get representative farmers for the longitudinal survey. Only few could be surveyed due to the quantity of data collected.
- Profitability: labour and other inputs were included. Farmer labour: we assessed whether the time spent on the farm gives returns above or not the money the farmer can get on the labour market. And it's the case.
- Farms producing below capacity. Milk needs to be given to the calf as well!

Conclusions about these findings can change the current development strategies and policies:

- Indeed, the findings may influence the sector if they are disseminated widely and includes guidelines for how people can interpret them. So need to have these messages disseminated and to start with people on the ground, including NAADS and DDA (Dairy development manager Florence Kasirye, DDA)
- Need for a multi disciplinary approach- we need more than what has been done in this project. For example, labour factor has been mentioned as constraint to low use of manure, but there are other factors (e.g. people not using time efficiently).

Discussion on the way forward: C Ebong

People agreed to a large extent about the conclusion of the study and the project will make the needed corrections. People agreed to this suggestion.

How can we use these results to shape the way forward?

- There is a need to translate these results into a useful tool? How these 3 districts differ and then treat them as recommendation domain. But maybe not simply use a geographic focus, better use constraints and opportunities to get into a country typology map, irrespective of geographical location. How to use this tool to help the zoning process?
- Zero-grazing may be profitable but should not be encouraged everywhere- for NGOs dealing with these, they need to go back and reconsider their strategies.
- To encourage manure utilization, what incentives should be given? Organic farming promoted maybe?
- If different farm have different challenges, we can use this model to give customized advice to the farmers, through the informed extension officers.
- It should be considered to develop the LP model into a full decision support tool!

Peter Lusembo: We need to simplify these findings in order to disseminate the information to a wide range of stakeholders, showing positive and negative aspects. Extension agents, NGOs and communities should be informed as they are the ones who need the info.

David Balikowa, DDA: Based on this study, we should be cautious to not always promote one specific type of dairy farming. We need to build scenario that incorporate market, resources and recommend specific feeding system, based on individual circumstances. The economists should present more results for different conditions.

Rilla Norslund, ASPS, DANIDA: Farmers normally do what is right for them so we should be careful about what to do. We need to help them to adapt to their challenges under changing conditions. So recommendations of anything new should build on a better understanding of why farmers choose that system.

Steve Staal: I agree with Rilla's point. For the idea of linking our results to the zonation, we could try to identify which systems are more likely to be durable in which areas.

In terms of scenario, e.g. change in price, decrease in land size etc.. we can do that in the LP model.

The core research team meets in the next days to see how we package the info for better dissemination. This workshop has been very useful to get feedbacks and identify gaps. So in a few weeks a larger report and updated brief will be available.

Dr. F Opio (dir. NAARI): The work done is very important. Presidential initiative on zoning and the zone have already been done. To assist the farmers to do the optimal combination, this research is useful. Decision tools delivered to the farmers, optimal combination targeted by farmer type. Need to better disseminate so that the results of the study can be used.

Edward Berinda, NAADS Mbarara: The research findings are good, but they are not new. Issues of marketing and economics are important. Need to look at marketing areas.

Steve: A lot of the work done earlier on dairy focuses on market, except this project. Both production and marketing issues are important. Issue of informal and formal markets, issue of demand for raw milk and market segmentation. We didn't address these issues in this project because there was a need to understand the farm level better vis-à-vis the market and other economic factors.

LoL (asked whether he has a contribution). Where's the market is the main question, given low costs of production, Uganda could export but it's not done and we should understand why. Under capitalization, poor management, Uganda lost opportunities. With increasing costs of production, it may have now become more difficult.

Main conclusions as put by Cyprian:

- Wider publicity, especially for farmers
- This study can contribute to the zoning process
- We need to refine the tool so that they can be used as a targeted decision tool
- we need some market studies

Steve: ASARECA led market study going on and that project will look at livestock and milk market, niche markets.

Dr. F. Opio:

She's happy with this project and with the LSRP project outputs. She thanks DANIDA for the support.

It's important for us to work with the farmers, and take into account market opportunities.

She will read the DG speech.

Rev Mrs Sandra Mwebaze represent Dr W. Olaho-Mukani. She reads the Minister's speech.

End of the workshop at 15.00 hours.