CIP
INTERNATIONAL POTATO CENTER
A CGIAR RESEARCH CENTER

Assessment of the ware potato storage practices of farmers and traders in Uganda and the performance of improved ambient ware potato stores

Kampala, May 28th, 2020

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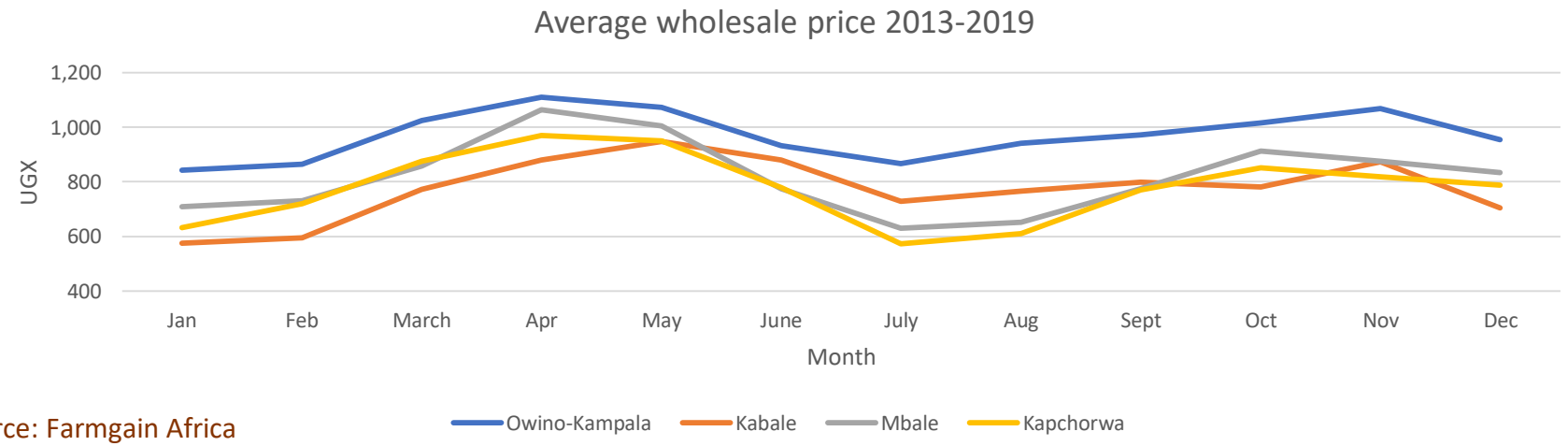
Context (1)

- Potato is an important food and cash crop in Uganda, mostly produced by smallholder farmers in the highlands of SW- and E-Uganda
- The seasonal mismatch of potato demand and supply results into high price fluctuations:
  - During the harvesting seasons, surplus of potato supply causes market prices to reduce
  - In other periods of the year, when potato is still in the field, market prices increase drastically due to scarcity



Source: Farmgain Africa

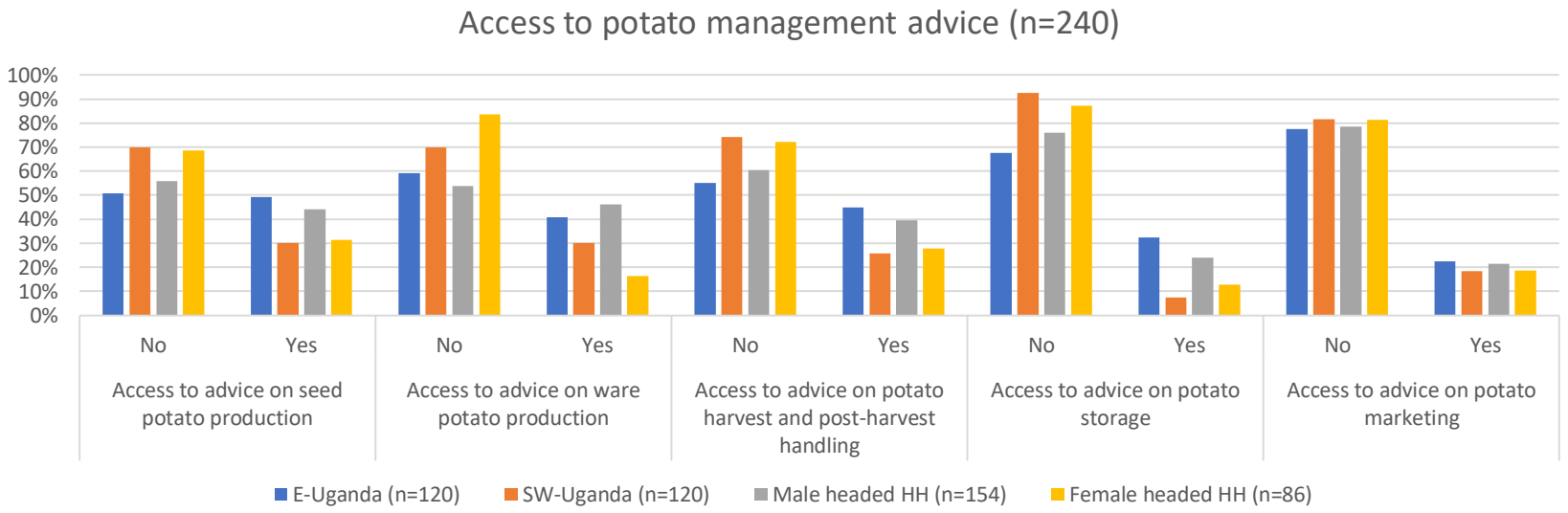
Context (2)

- Price fluctuations negatively affect all actors along the Ugandan potato value chain
- Promotion of ware potato storage is one of the options to reduce price fluctuations and post-harvest losses
- The technology of improved ambient ware potato stores has been piloted by CIP and IFDC in E- and SW-Uganda
- Objectives of this potato research funded by GIZ:
  - Understanding of the current ware potato storage and marketing practices of farmers and traders in Uganda and their socio-economic drivers
  - Analysis of the profitability and management performance of the improved ambient group and individual ware potato stores
  - Determination of the scalability potential of improved ambient ware potato storage

Research methodology

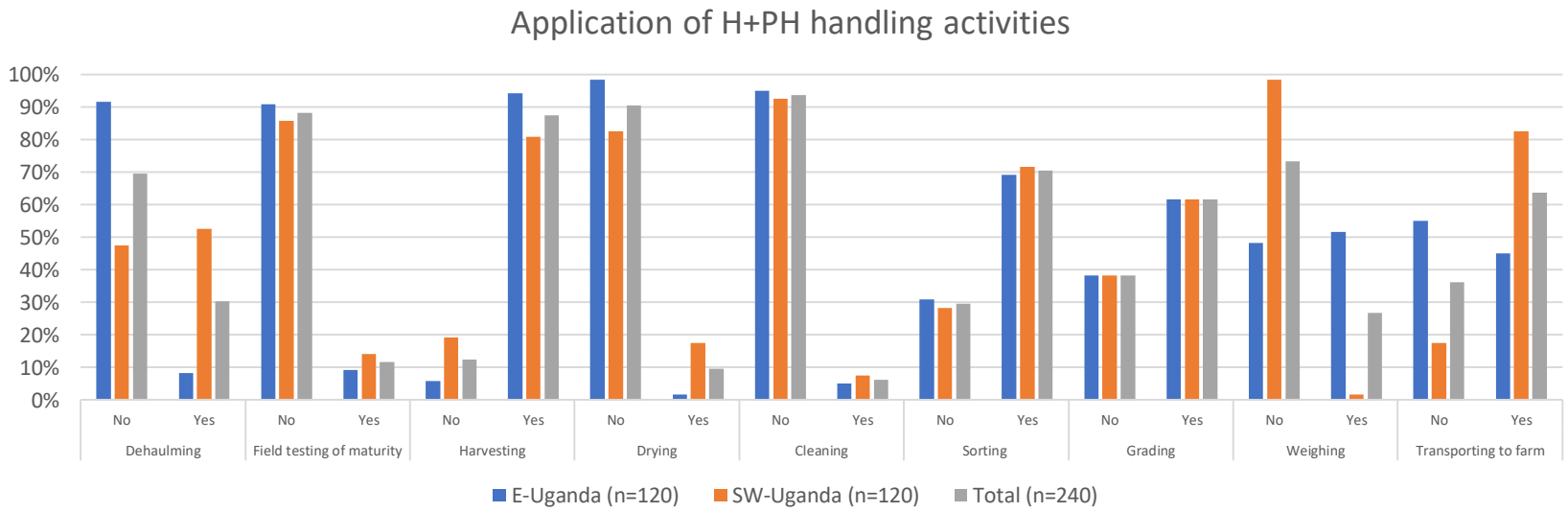
- Assessment of the ware potato storage practices:
  - Farmer survey (February-March 2019):
    - 6 districts (Mbale, Kapchorwa, Kween, Rubanda, Kanungu and Kisoro districts)
    - 4 villages per district in 2 major potato producing sub-counties
    - 10 farmers per village, total of 240 farmers (114 male, 126 female)
  - Trader survey (February-April 2019):
    - 5 districts (Mbale, Kapchorwa, Ruband, Kanungu and Kisoro districts) + Kampala
    - 2 markets per district + 5 markets in Kampala
    - +/- 8 traders per market, total of 125 traders (95 male, 30 female)
- Assessment of the performance of improved ambient stores:
  - Survey groups managing improved ambient store (February-March 2019):
    - 41 farmers (23 male, 18 female) and 12 traders (10 male, 2 female)
    - 5 group stores (Mbale: 2, Kapchorwa: 1, Kween: 1, Kisoro: 1)
  - Continuous data collection on costs and potato flow in/out (11/18-03/20, 2 storage seasons)

Potato storage practices of farmers (1)



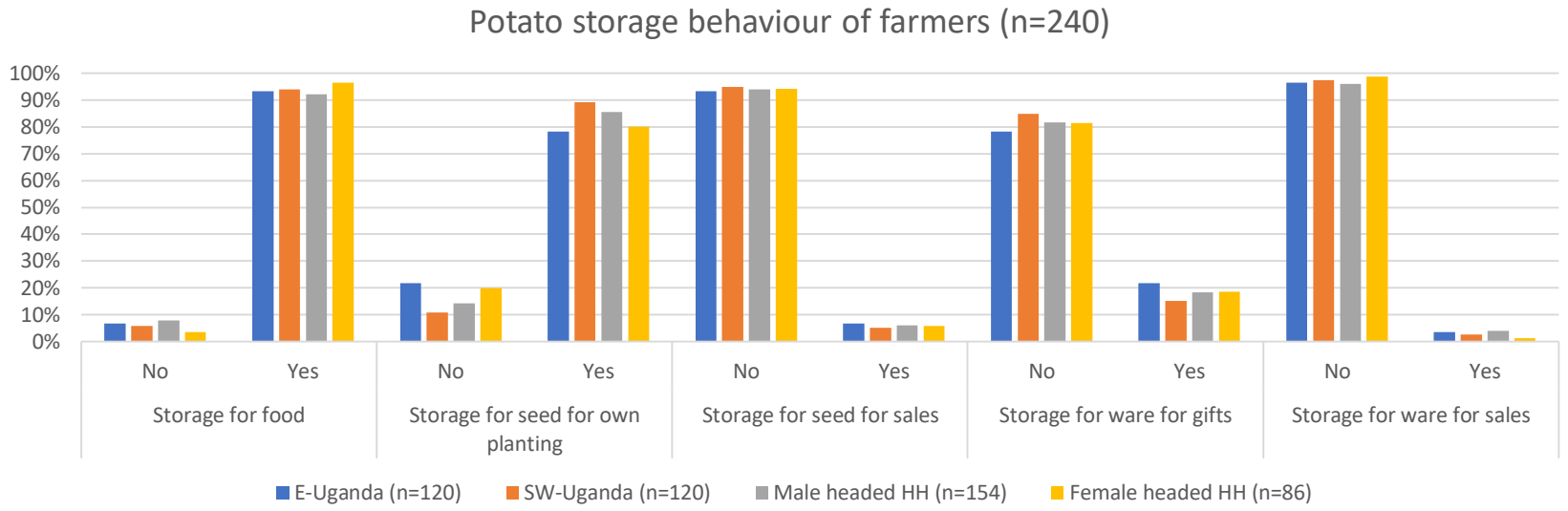
- Big information gap: 60-80% of potato farmers have no access to potato management advice
- +/- 55% of potato farmers getting advice on potato storage receive it mainly from fellow farmers or family members
- +/- 45% of potato farmers getting advice on potato storage receive it every season

Potato storage practices of farmers (2)



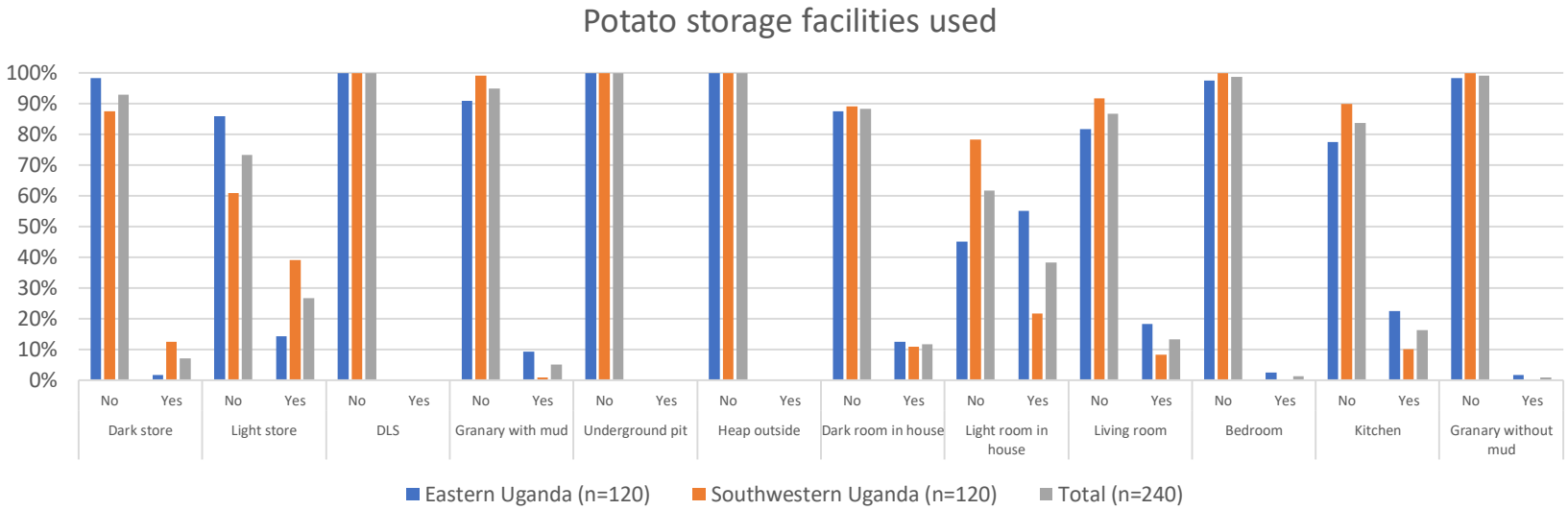
- Dehaulming is done more frequently in SW-Uganda compared to E-Uganda
- Field testing of maturity, drying and cleaning are done at a very low rate (potato sold fresh, labour intensive, no time, not to reduce weight)
- Majority of farmers sort and grade the potato (size and variety are the most important quality criteria traders use in potato purchase)
- Weighing is done at a higher rate in E-Uganda (potatoes are sold per kg)

Potato storage practices of farmers (3)



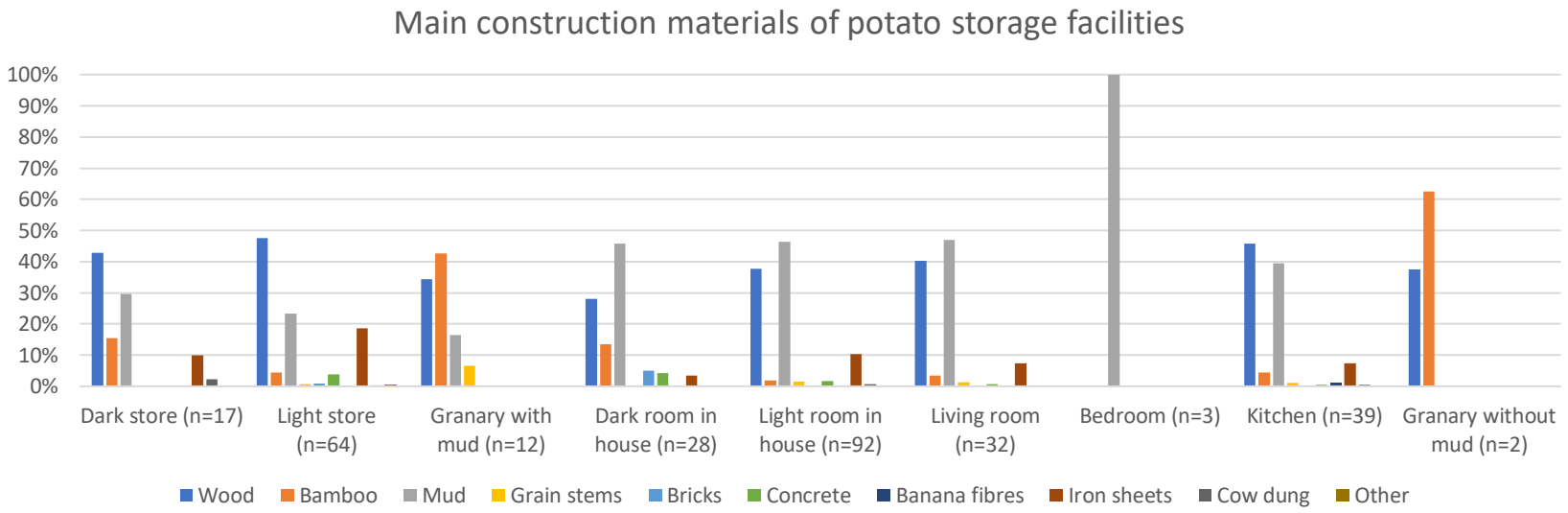
- Potato sold fresh (+/- 60%), stored for food at home (+/- 15%) and stored for seed for own planting (+/- 15%) make up the majority of the use of the potato harvest
- Main reasons no storage for ware for sales: need for money, not enough to store, to avoid losses due to pests and diseases, no storage facility
- Potato storage duration: food at home (+/- 1.5-2 months), seed for own planting (+/- 3 months)

Potato storage practices of farmers (4)

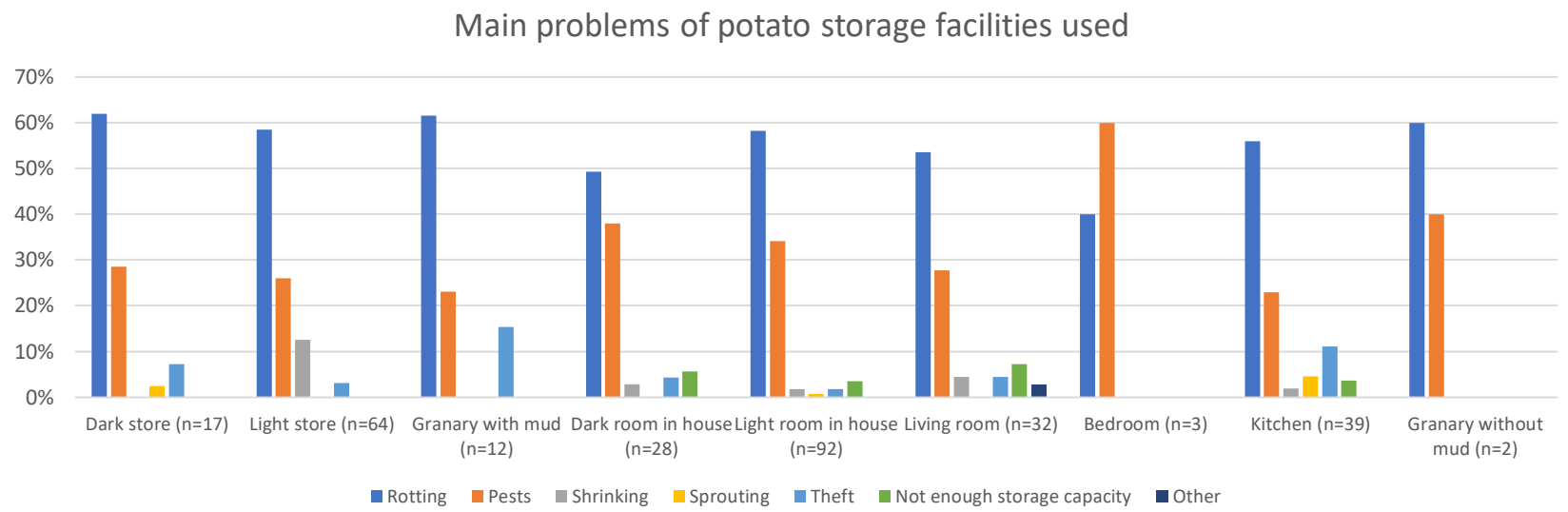


- Farmers use light space (light store, light room in house, living room, kitchen, granary without mud) more frequently compared to dark space (dark store, granary with mud, dark room in house, bedroom):
  - More available and easier/cheaper to construct
  - Good for short term storage and adapted to the small potato volumes stored
  - Easy to manage the potato and to maintain the store
  - Good aeration
  - Lack of knowledge on dark space

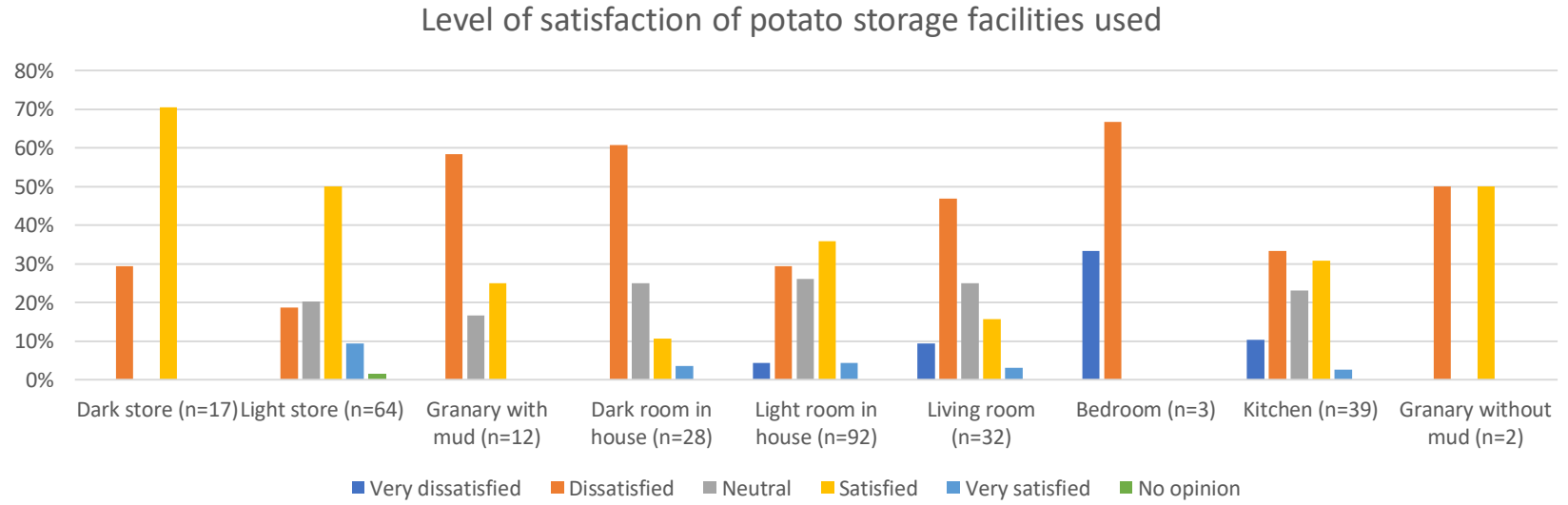
Potato storage practices of farmers (5)



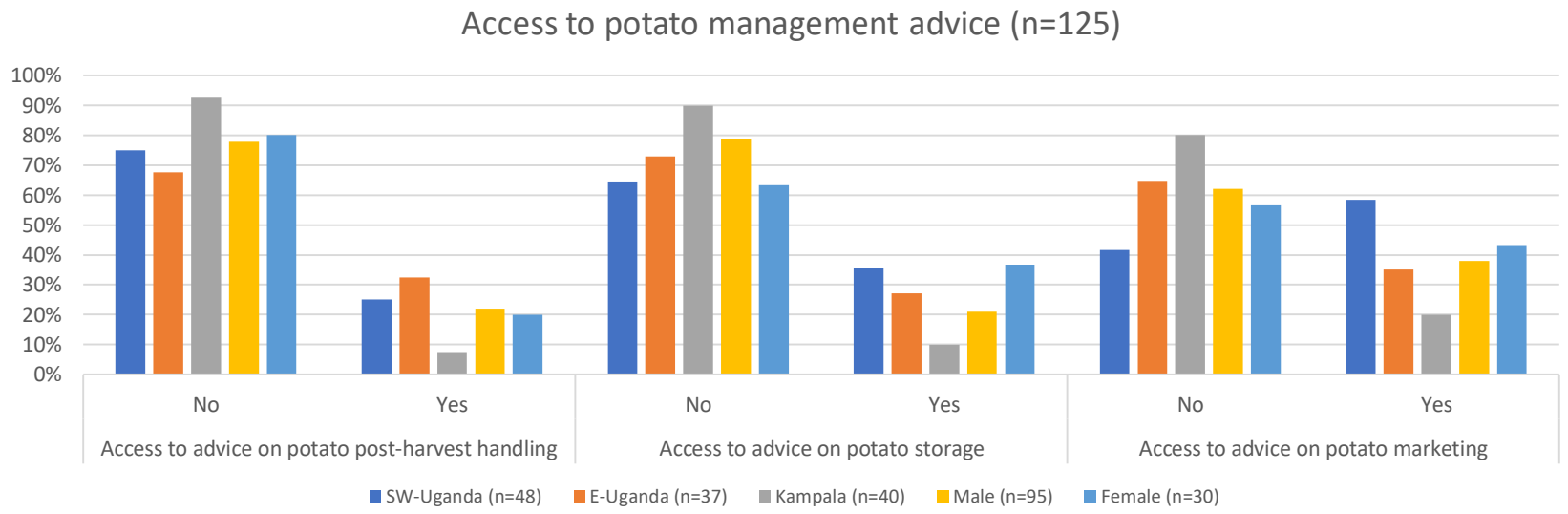
Potato storage practices of farmers (6)



- Rotting and pests are the main problems faced by farmers during storage

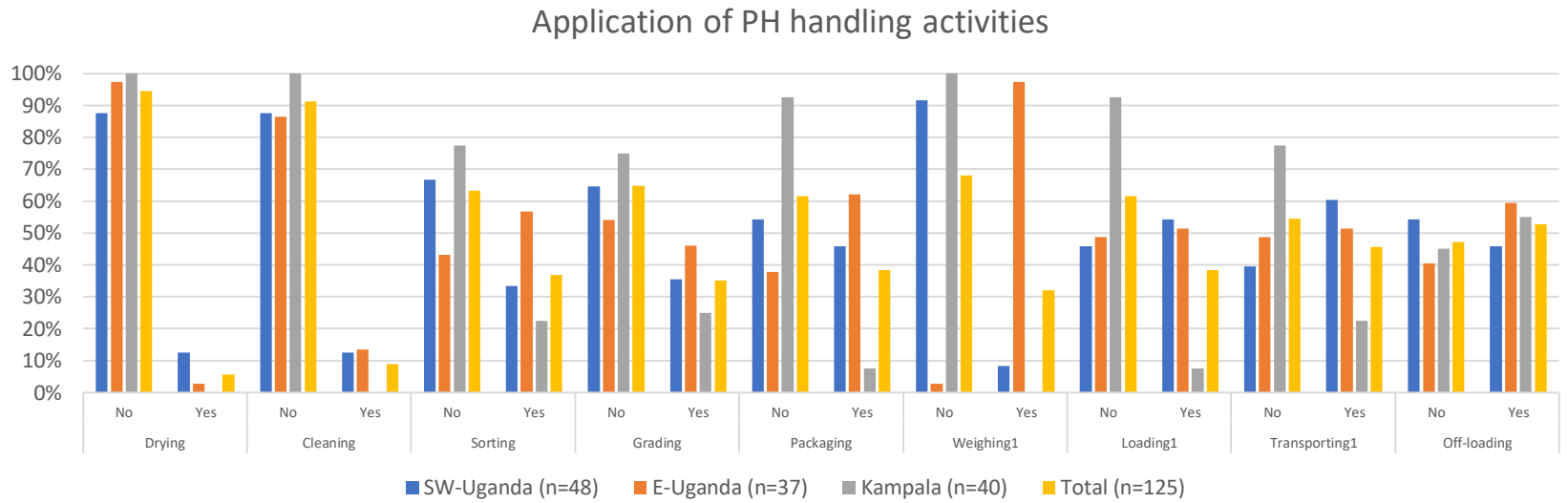


Potato storage practices of traders (1)



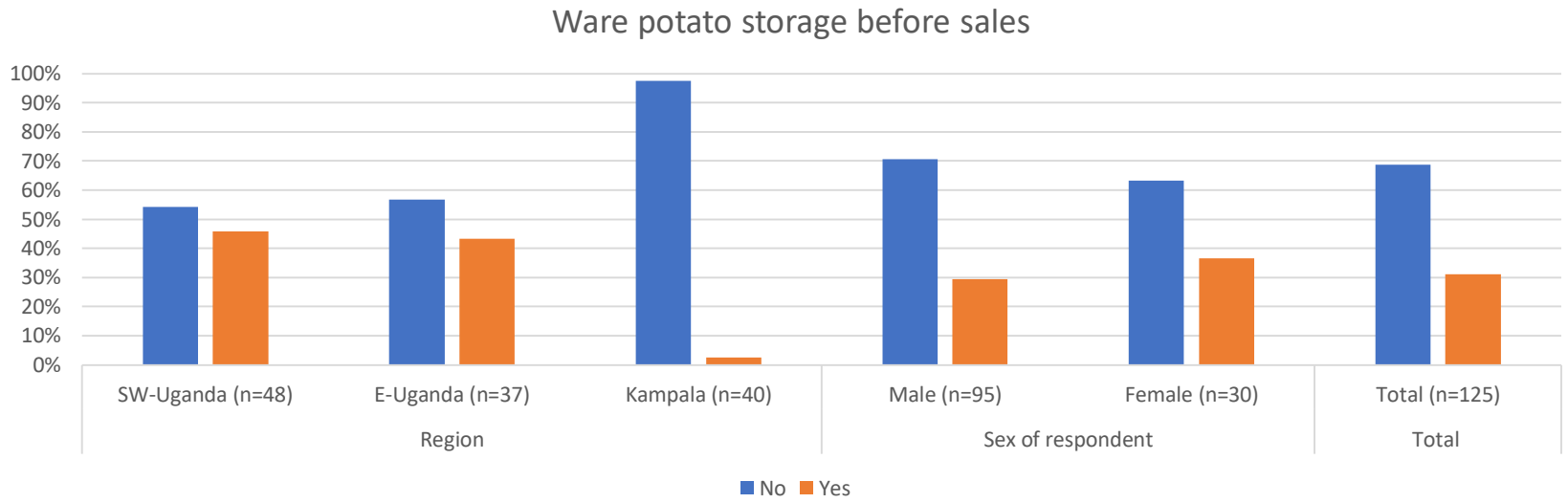
- Big information gap: 60-80% of potato traders have no access to potato management advice
- +/- 52% of potato traders getting advice on potato storage receive it mainly from fellow traders or family members
- +/- 52% of potato traders getting advice on potato storage receive it once

Potato storage practices of traders (2)



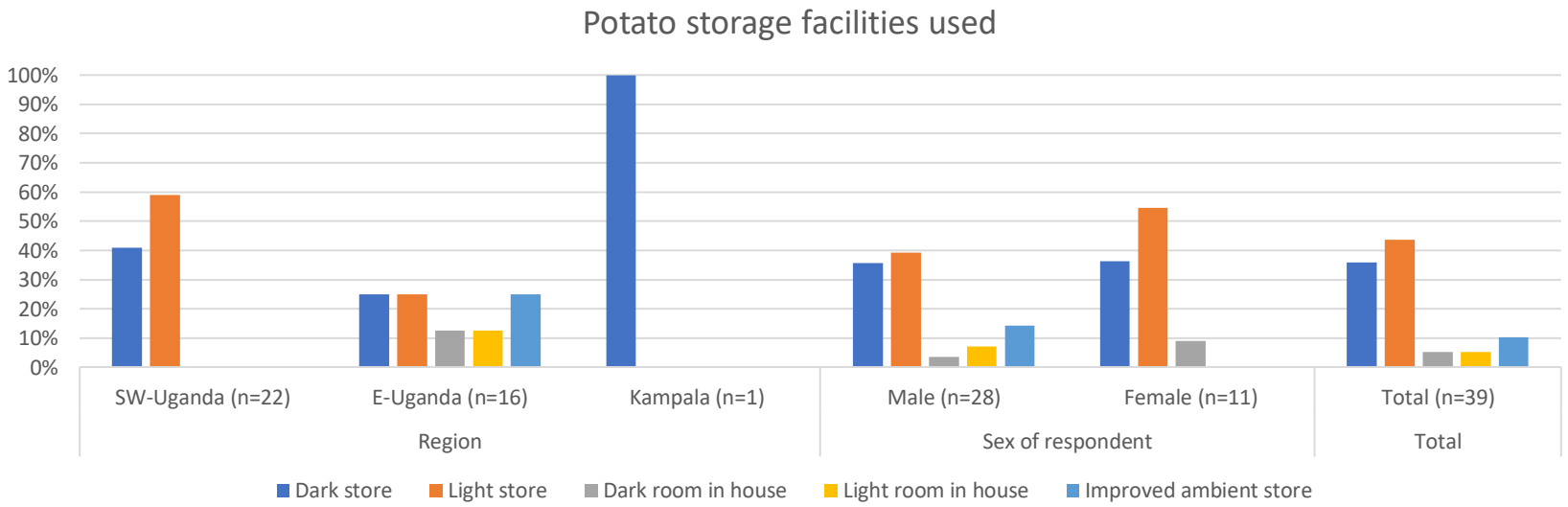
- Minority of traders implement value addition activities like drying, cleaning, sorting and grading: lack of knowledge, fear of losses, no time, costly, no market demand/higher price for quality potato, market is sure even without value addition, no potato storage
- Sorting and grading are done by +/- 40% of the traders (size and variety are the most important quality criteria customers use in potato purchase)
- Weighing is done at a higher rate in E-Uganda (potatoes are bought per kg)

Potato storage practices of traders (3)



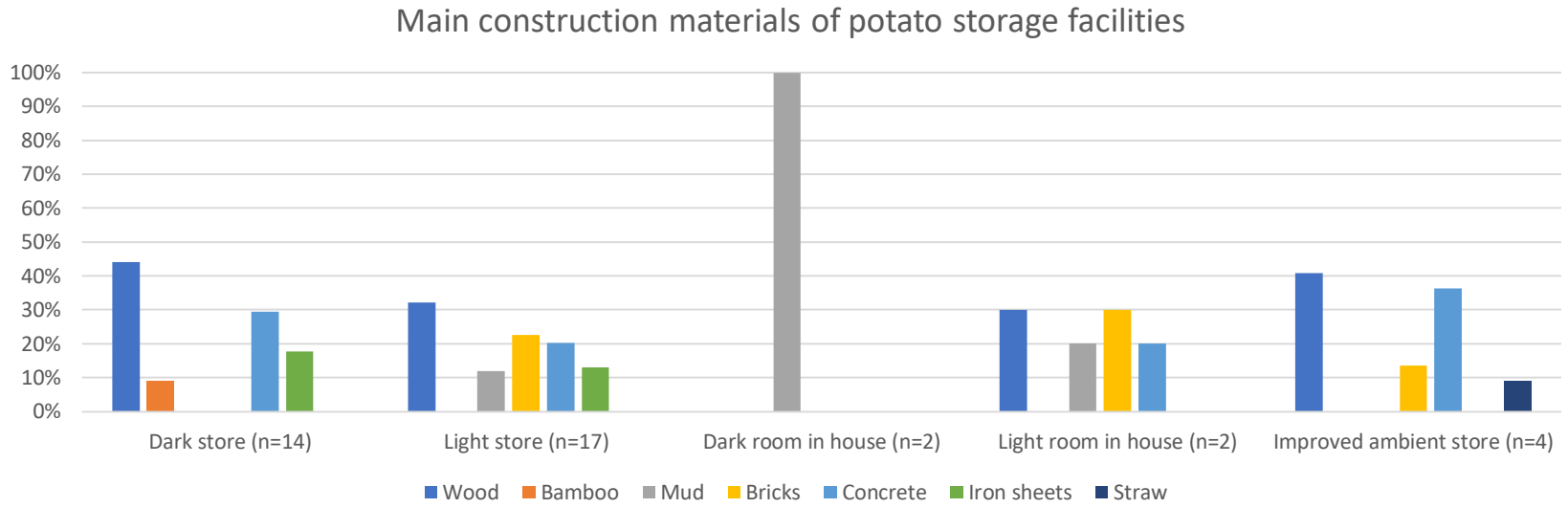
- Volumes of ware potato stored are low compared to volumes of ware potato purchased (1.5-3%)
- Main reasons no ware potato storage: no storage facility, need for money (only 50% has access to credit), to avoid losses due to pests and diseases, high demand
- Main reasons ware potato storage: low market price not covering the costs, profitable, low demand
- Ware potato storage duration: peak purchase months (+/- 30 days), low purchase months (+/- 15 days)

Potato storage practices of traders (4)

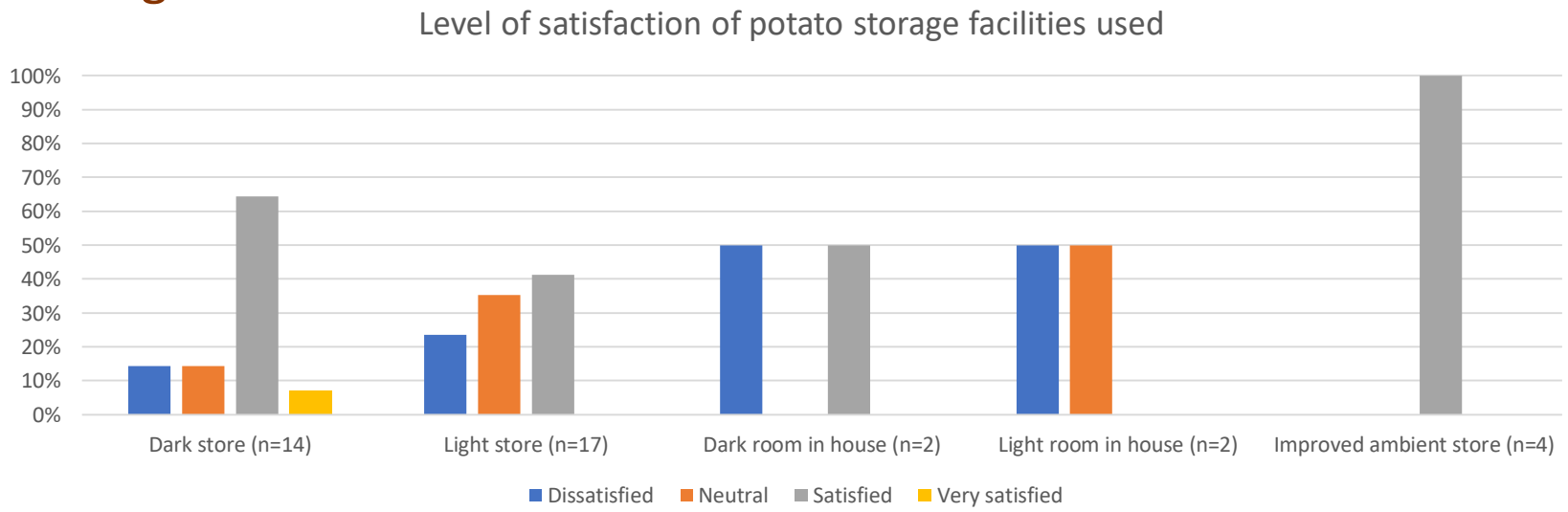


- Majority of the potato storage facilities are on the rural/urban market, only 30% of them are owned by the traders
- Drivers for using a light space: storage for a short time, only store available, lack of knowledge on dark space, cheaper, easier to manage, good aeration, storage of other crops too
- Drivers for using a dark space: lower losses, profitable, protected from theft, protected from rain, knowledge on good practices, longer durability

Potato storage practices of traders (5)



- Rotting and shrinking are the main problems faced by traders during storage



Characteristics of improved ambient stores

Individual store (11 built, 10 used)	Group store (6 built, 4 used)
Cost of construction: +/- USD 1,087.6	Cost of construction: +/- USD 15,000
+/- 8 t storage capacity	+/- 50 t storage capacity
Estimated lifespan of 10 years	Estimated lifespan of 10 years
• Use of strong poles • Floor of strong timber frames • Rat proof netting on the floor • Walls covered with planed timber and papyrus mats to minimize light • Corrugated iron roof • False ceiling with layer of straw • Ventilation window facing the common direction of the wind	• Compressed straw bales, strong timber strut frames on a metal super structure that sits on a re-enforced gabion foundation • Wind vent fitted at the corner opposite the door • Floors made of strong timber struts covered with expanded metal (rat damage ↓, floor ventilation ↑) • Walls plastered with cement to protect the straw • Corrugated iron roof on a timber pole frame to cover the ambient store
	

Overall state of improved ambient stores

Individual stores

- No rat proof netting and false ceiling
- Large openings: too much light in the store, risk for pests
- No shelves for storing potato (only 1 out of 11): inefficient use of space available
- Floors of stores without extra support by bricks/rocks have collapsed

Group stores

- Problems encountered: rotting of floor, floor netting is damaged, supporting poles metal roofing eaten by termites, cracks in the outer cement layer, wind blows off metal roofing, complete collapse of stores, surroundings very dirty
- Overall state of group stores makes farmers reluctant to store







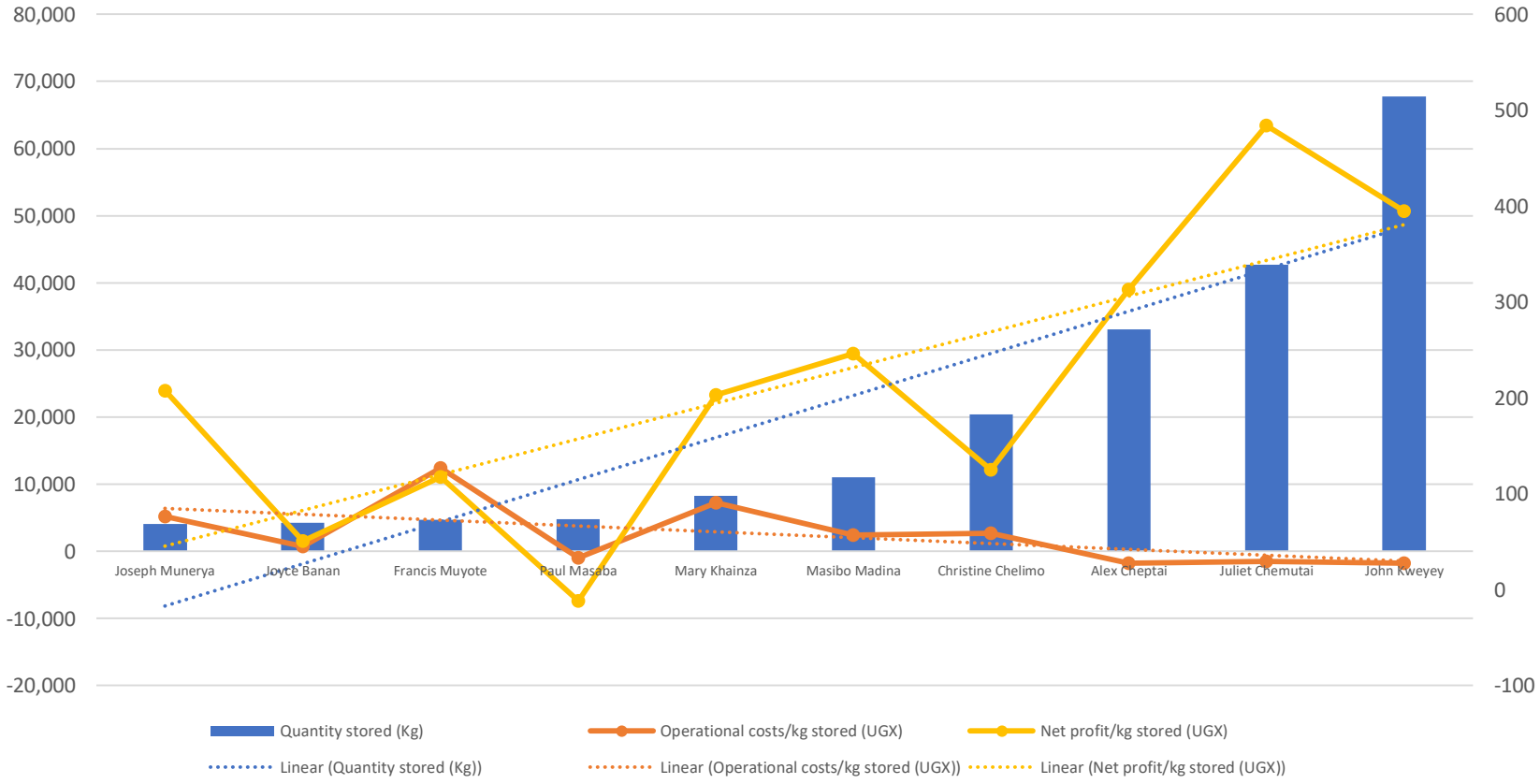

Performance of improved ambient individual stores (1)

District	Name	Quantity stored (MT)	Max % installed capacity used	Average storage days tubers	Number of users	Large potato in	Good potato out
Mbale	Francis Muyote	4.67	58.4%	80.1	1	85.7%	97.6%
	Mary Khainza	8.22	69.0%	42.0	3	38.3%	97.6%
	Masibo Madina	11.01	16.9%	26.0	6	91.6%	99.6%
Kapchorwa	Christine Chelimo	20.40	97.5%	52.3	1	77.9%	89.2%
	Joseph Munerya	4.10	51.3%	27.0	1	97.6%	92.7%
	Joyce Banan	4.20	32.5%	29.4	1	83.3%	100.0%
	Paul Masaba	4.80	60.0%	26.0	1	83.3%	83.3%
Kween	Alex Cheptai	33.10	143.8%	39.9	13	81.6%	99.4%
	John Kweyey	67.80	275.0%	28.5	10	68.1%	89.1%
	Juliet Chemutai	42.70	186.3%	32.8	8	66.0%	93.9%
AVERAGE		**20.10**	**99.1%**	**38.4**	**4.5**	**77.4%**	**94.2%**
STDEV		**21.50**	**80.4%**	**17.0**	**4.5**	**16.7%**	**5.6%**

- Total volumes stored differ widely among the stores
- Average storage duration of 1-2.5 months
- Half of the stores are not used on an individual basis, but are shared on an informal basis with other potato farmers from the community
- Majority of ware potato stored is large sized
- Limited quality loss during storage

Performance of improved ambient individual stores (2)

- 9 out of 10 stores make an annual net profit, profitability increases with volumes stored



Performance of improved ambient individual stores (3)

- B/C = financial ratio to determine whether the amount of money made through an investment will be greater than the costs incurred due to the investment (B/C < 1: costs outweigh benefits, B/C > 1: benefits outweigh costs)
- Payback period = time required to recover the funds expended through the net cash flows generated by the investment, or to reach the break-even point (the longer the payback period, the higher the risk)

District	Name	B/C	Payback period (years)
Mbale	Francis Muyote	1.29	4.40
	Mary Khainza	2.10	1.99
	Masibo Madina	3.07	1.32
Kapchorwa	Christine Chelimo	2.31	1.40
	Joseph Munerya	1.72	3.32
	Joyce Banan	1.01	6.91
	Paul Masaba	0.65	12.67
Kween	Alex Cheptai	7.74	0.38
	John Kweyey	11.75	0.15
	Juliet Chemutai	12.17	0.19

Performance of improved ambient group stores (1)

- Farmer group store

District	Name	Quantity stored (MT)	Max % installed capacity used	Average storage days tubers	Number of users	Large potato in	Good potato out
Mbale	WASWAPA	29.10	47.17%	26.2	11.0	79.52%	96.56%
Kapchorwa	KIPA	29.90	32.00%	45.5	5.0	67.22%	86.96%
Kween	MIFA	168.80	88.00%	29.6	19.0	83.89%	91.82%
Kisoro	RRBG	51.50	33.60%	15.4	8.0	100.00%	98.58%
AVERAGE		**69.82**	**50.2%**	**29.2**	**10.8**	**82.7%**	**93.5%**
STDEV		**66.79**	**26.1%**	**12.4**	**6.0**	**13.5%**	**5.2%**

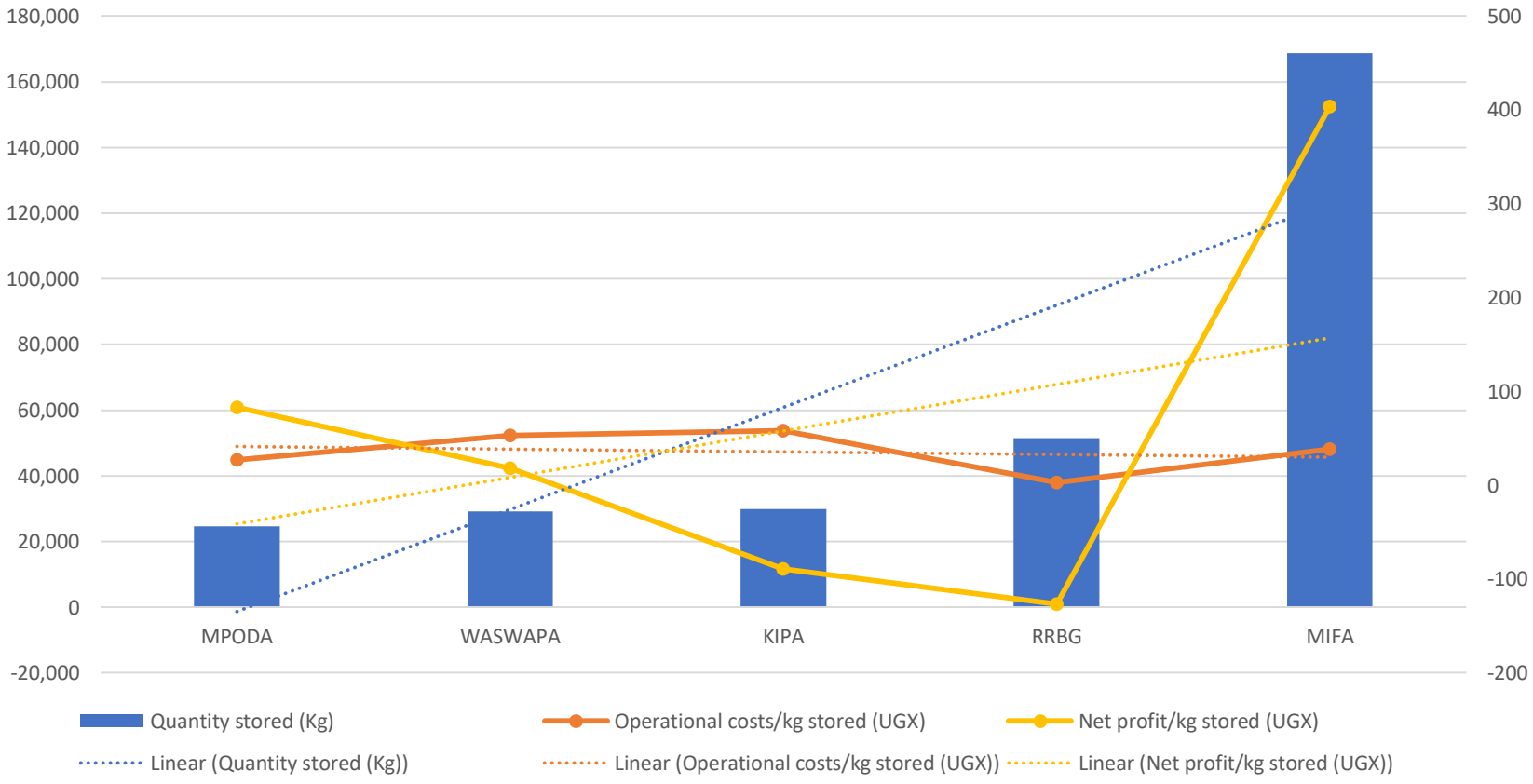
- Trader group store

District	Name	Quantity stored (MT)	Max % installed capacity used	Average storage days tubers	Number of users	Large in %	Good out %
Mbale	MPODA	24.60	27.2%	53.4	5.0 + group	65.0%	93.6%

- Stores are not used at full capacity
- Average storage duration of 0.5-1.75 months
- Majority of ware potato stored is large sized
- Limited quality loss during storage
- Limited number of farmers account for the bulk of the potato stored
- 8-63% of participation rate of group members (volumes female: 0-20%)

Performance of improved ambient group stores (2)

- 3 out of 5 stores make an annual net profit, profitability increases with volumes stored



Performance of improved ambient group stores (3)

Group policy defined in store management plans: deduction of 2% monthly storage fee + distribution of revenue based on shares

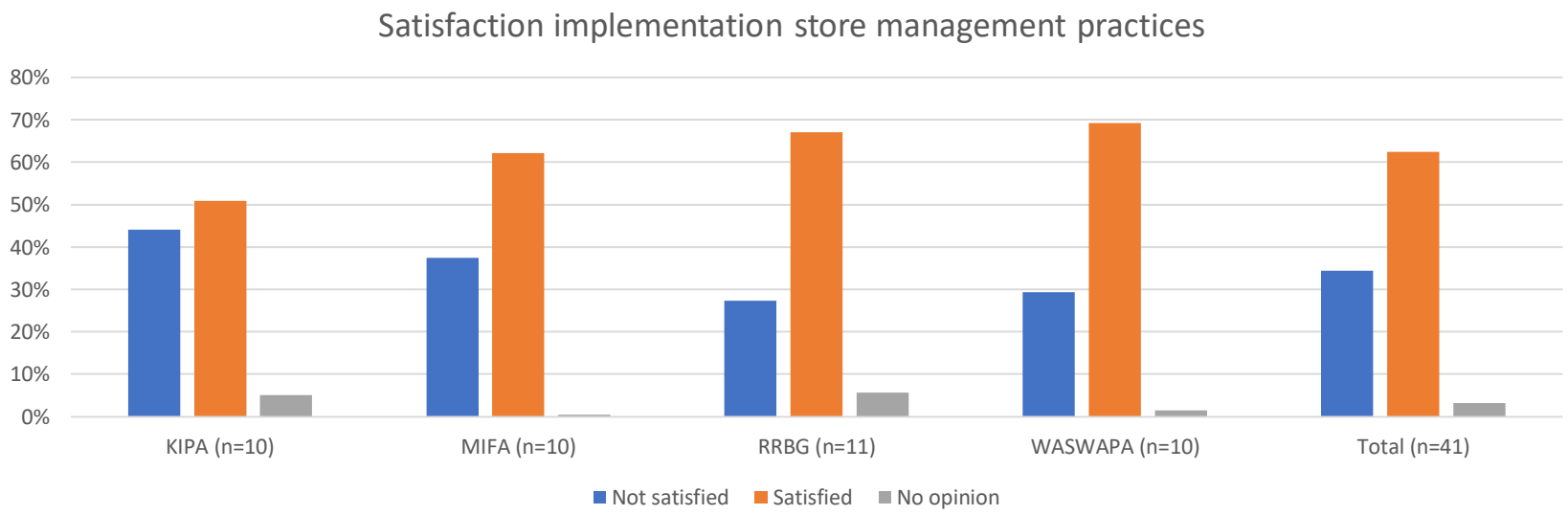
District	Name	Annual net profit (UGX)	Group policy	Net cash flow to group (UGX)
Mbale	WASWAPA	528,300	UGX 200 per 80kg bag stored	72,742.5
Kapchorwa	KIPA	-2,677,400	0 for the moment, will be discussed when storage volumes increase	0
Kween	MIFA	68,098,100	2% of potato sales to MIFA	3,199,136
Kisoro	RRBG	-7,476,600	UGX 10,000 per person for storage > 4 weeks	40,000
Mbale	MPODA	2,031,408	Individual storage: UGX 3,000 per 100 kg bag Group storage: sharing of net cash flow (60% to members, 30% savings, 10% store management)	2,495,802

District	Name	B/C*	Payback period (years)*
Mbale	WASWAPA	0.80	9.17
Kapchorwa	KIPA	0.48	19.21
Kween	MIFA	5.52	0.76
Kisoro	RRBG	-0.19	∞
Mbale	MPODA	0.95	7.37

* Supposing that 100% of the net cash flow is flowing back to the group, which is not the case

Performance of improved ambient group stores (4)

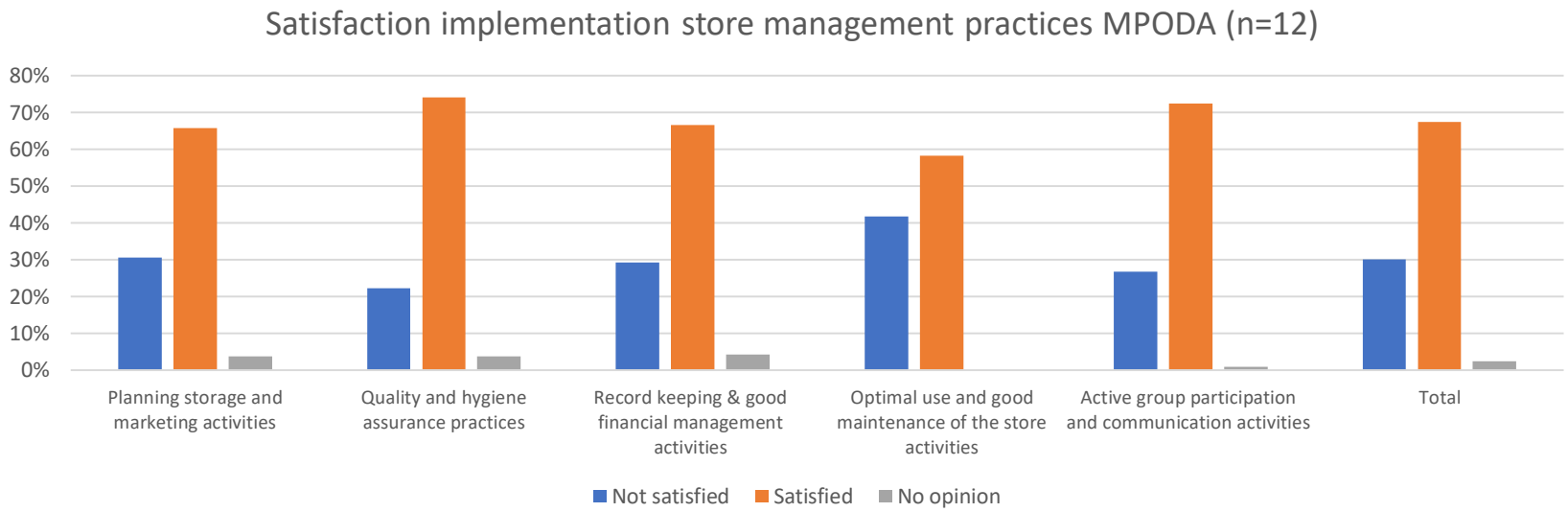
- Farmer group store
  - ‘Having a personal store’, ‘fear of theft’ and ‘group store to far’ are the main reasons for not storing in a farmer group store
  - Influence of tuber size on storage duration differs from store to store
  - Main problem during storage in farmer group stores was ‘quality loss’



  - ‘Organizational development’ and ‘access to more resources’ are considered by the farmer group members as most essential to improve the group store management

Performance of improved ambient group stores (5)

- Trader group store
  - ‘Have to sell immediately to get money’, ‘not enough potato’ and ‘high demand’ are the main reasons for not storing in a trader group store
  - Main problems during storage in trader group store were ‘quality loss’ and ‘not enough potato’



  - ‘Organizational development’ and ‘access to more resources’ are considered by the trader group members as most essential to improve the group store management

Conclusion (1)

- Farmers and traders face low access to advice on potato storage
- Farmers don't store potato for selling as ware potato at a later time, most (+/- 90%) of the harvested potato is sold fresh, stored for food at home and stored for seed for own planting
- Dark spaces for potato storage are not widely used by farmers
- Affordability, safe from theft, maintains the quality and easy to monitor are critical selection criteria of a storage facility used by potato farmers
- Traders in Kampala don't store ware potato, 40% of the traders in up-country markets store ware potato
- The total volumes of potato stored by traders compared to the total volumes of potato purchased are extremely low (1.5-3%)
- Maintains the quality, adapted to the volumes to store, safe from theft and easy to monitor are critical selection criteria of a storage facility used by potato traders
- Users of dark stores seem to be more satisfied than users of light stores

Conclusion (2)

- Farmers and traders encounter difficulties to maintain the improved ambient stores in good state
- Performance of the improved ambient ware potato stores

Performance criteria	Improved ambient individual store	Improved ambient group store
Average storage duration	1-2.5 months	0.5-1.75 months
Maximum capacity used ≥ 50% of installed capacity	8 out of 10 stores	1 out of 5 stores
B/C > 1	9 out of 10 stores	1 out of 5 stores
Payback period < 5 years	8 out of 10 stores	1 out of 5 stores
Average % large potato in	77.4%	79.1%
Average % good potato out	94.2%	93.1%
Participation rate of group members in storage in group store	-	8-63%
Share female farmers and traders in total volumes stored in group store	-	0-20%

- 2/3 of the members of the groups (farmers + traders) managing the group store are satisfied with the management of the store
- 'Organizational development' and 'access to more resources' are considered as most essential to improve the group store management

Suggested way forward

- Farmers:
  - Increased productivity is critical to allow farmers to store ware potato for later sales
  - Increasing knowledge on good potato management practices and the importance of dark stores for good storage conditions
  - Promotion of small dark wooden stores with a capacity of 4-8 t managed individually but optionally shared on an informal basis with other potato farmers from the community: they are affordable, maintain the quality of the stored potato, are profitable, has a reasonable payback period and do not encounter group management problems
  - Local capacity development is essential to allow the maintenance in good state of the stores promoted
- Traders:
  - Increasing knowledge on good potato management practices and the importance of dark stores for good storage conditions
  - Market development for quality ware potato
  - Organizational development
  - Improvement of credit terms

The International Potato Center (known by its Spanish acronym CIP) is a research-for-development organization with a focus on potato, sweetpotato, and Andean roots and tubers. CIP is dedicated to delivering sustainable science-based solutions to the pressing world issues of hunger, poverty, gender equity, climate change and the preservation of our Earth's fragile biodiversity and natural resources.

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