The fundamental role of livestock and livestock products in increasing the resilience of the vulnerable

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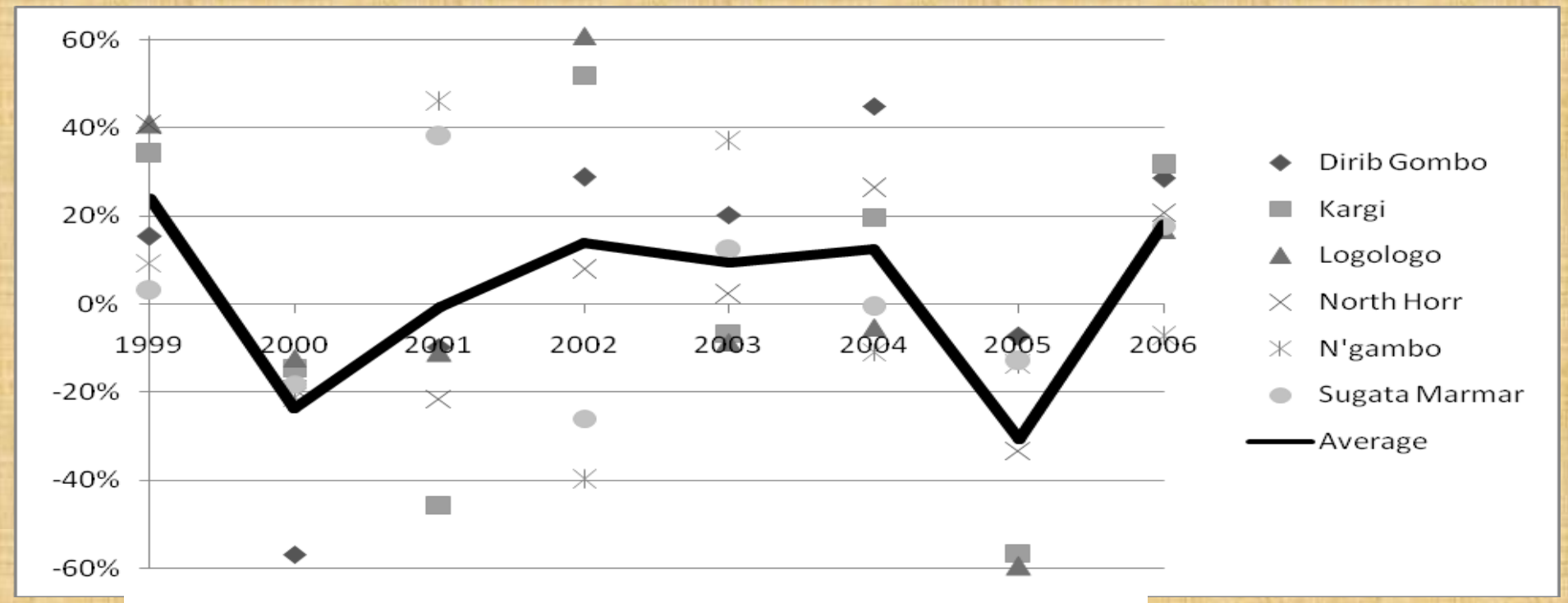
I will be drawing on different projects over time (1999 to present)

- USAID Pastoral Risk Management Project, GL-CRSP, Kenya and Ethiopia
- USAID Index Based Livestock Insurance, AMA/BASIS-CRSP, Kenya and Ethiopia
- USAID Mali Livestock Pastoralist Initiative, GL-CRSP/ USAID Mali
- USAID La Gestion des Systèmes Fluviaux pour l'Avenir- RIVERS, ALSCC-CRSP, Mali and Senegal
- USAID Land Administration to Nurture Development, Ethiopia
- DfID, BRACED, NEF, Decentralized Climate Funds, Mali and Senegal



Northern Kenya Rainfall

Z scored annual

$$RZ=\frac{annual\ amount-mean}{\sigma}$$

McPeak, Little and Doss, 2012

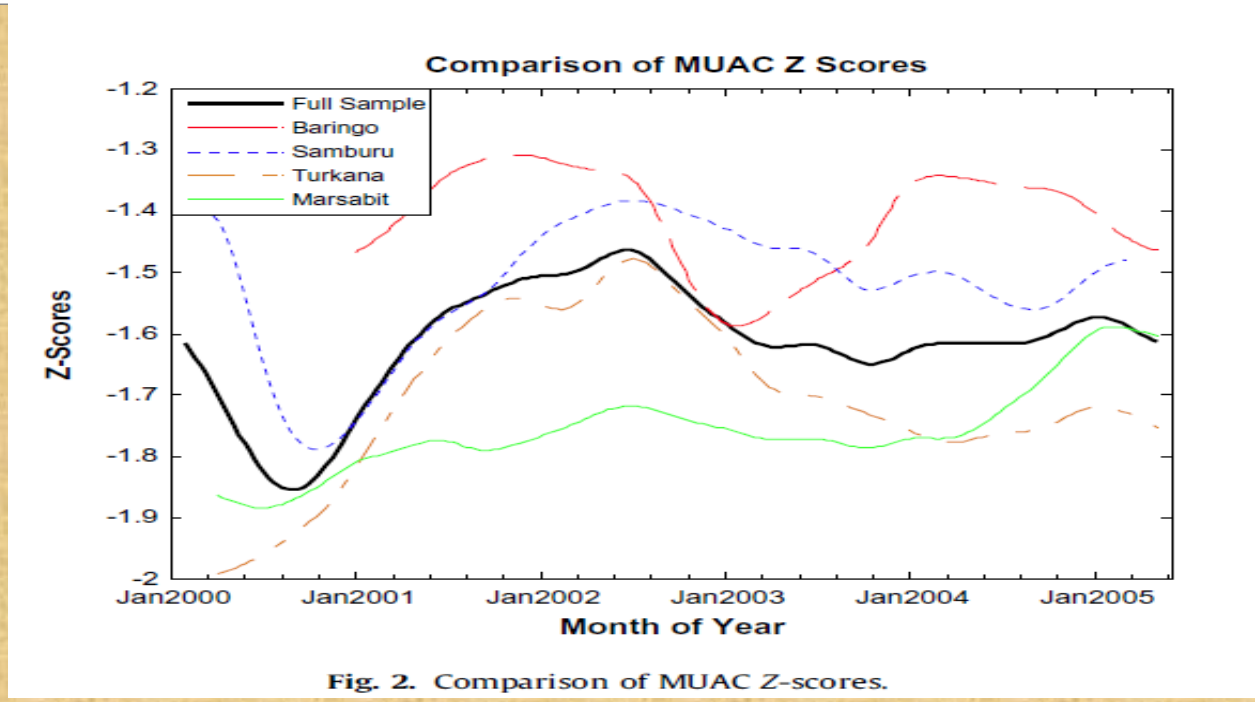


Fig. 2. Comparison of MUAC *Z*-scores.

Z-scored data points.
Top panel is deviation of annual rainfall from the annual mean

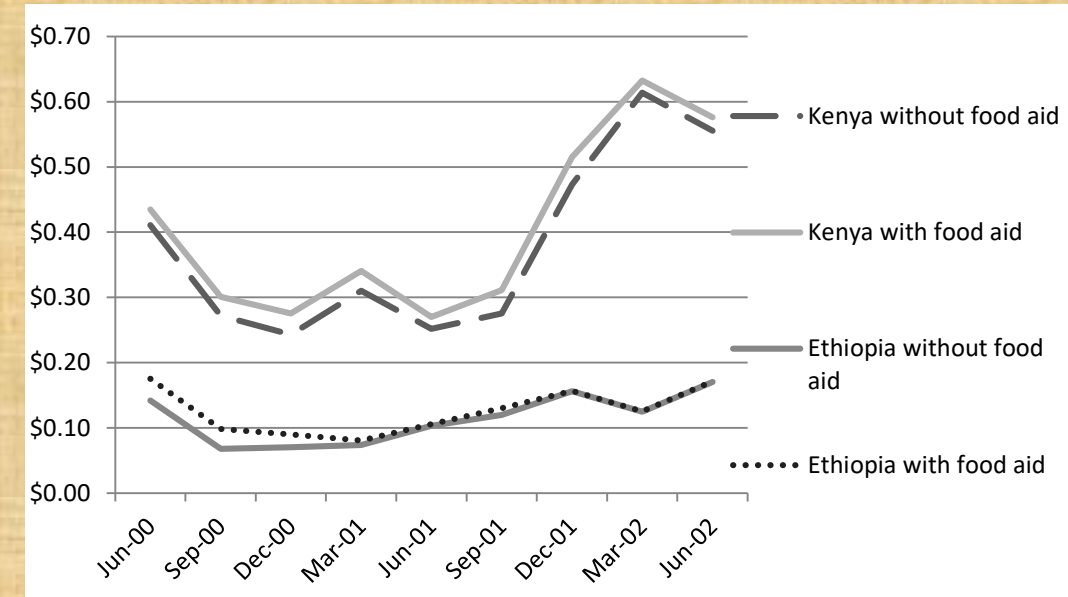
Bottom panel is mid-upper arm circumference data from children in different communities in northern Kenya

ALRMP World Bank data.

Mude et al. 2009

PARIMA Data, Kenya and Ethiopia

Total income, including value of home consumed milk



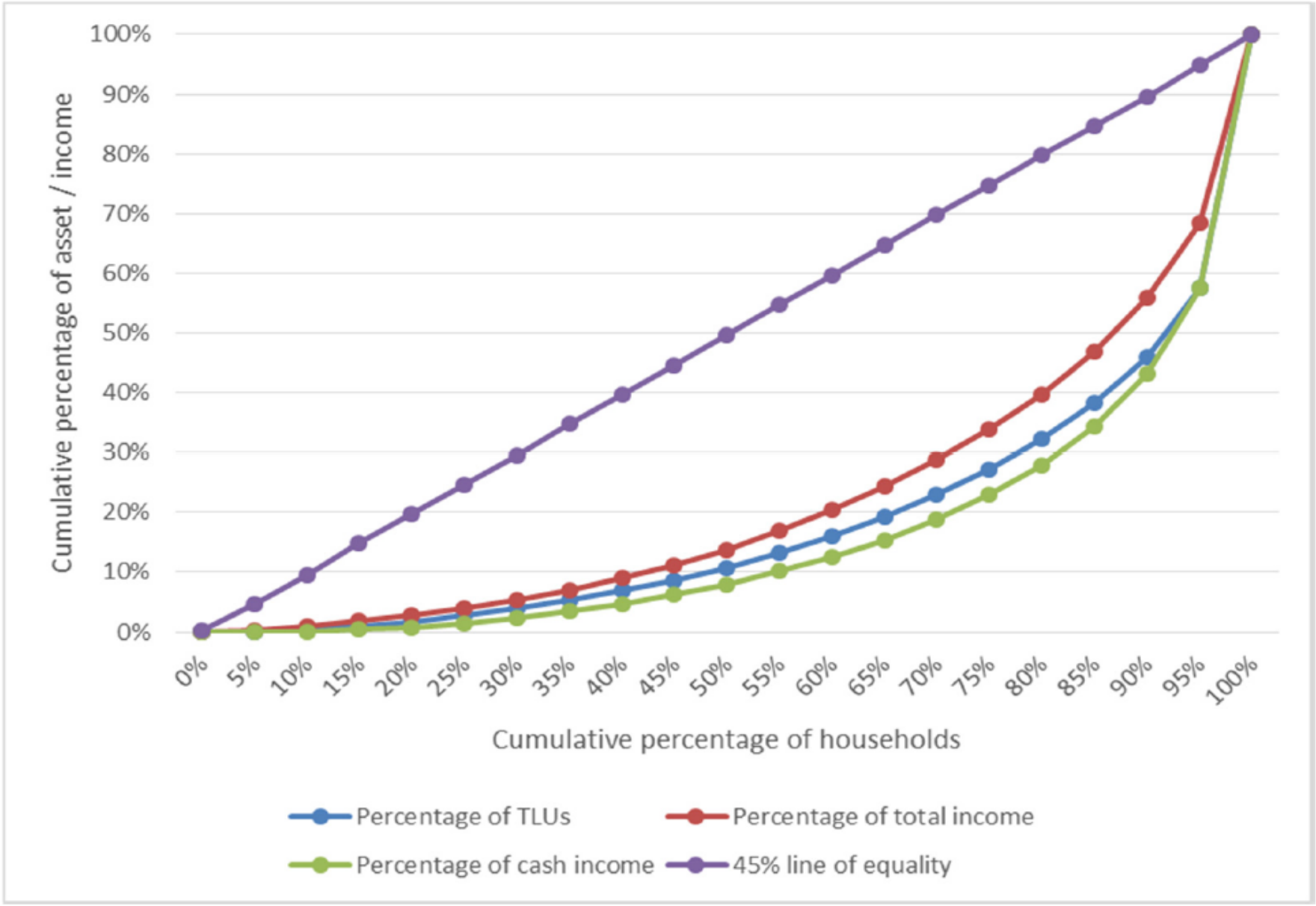
	Herd Size March 2000	Cash Income June 2000
Left out	Below median	Below median
Moving From	Below Median	Above Median
Staying With	Above Median	Below Median
Combining	Above Median	Above Median

McPeak, Little, and Doss 2012, Data from 1999-2002

Group	Herd Size TLU	Total Income per capita per day	Cash Income as % of Total Income	Total Income variability (cv)
1) Left out	7.3	$0.20	29%	1.32
2) Moving From	7.2	$0.27	46%	0.90
3) Staying With	23.7	$0.34	21%	0.82
4) Combining	26.0	$0.46	35%	0.63
Significant difference in means by groups, t-statistics	t12 , t13 ***, t14 ***, t23 ***, t24 ***, t34 ,	t12 , t13 , t14 **, t23 , t24 ***, t34 ,	t12 ***, t13 **, t14 *, t23 ***, t24 ***, t34 ***,	t12 **, t13 ***, t14 ***, t23 , t24 ***, t34 ***,

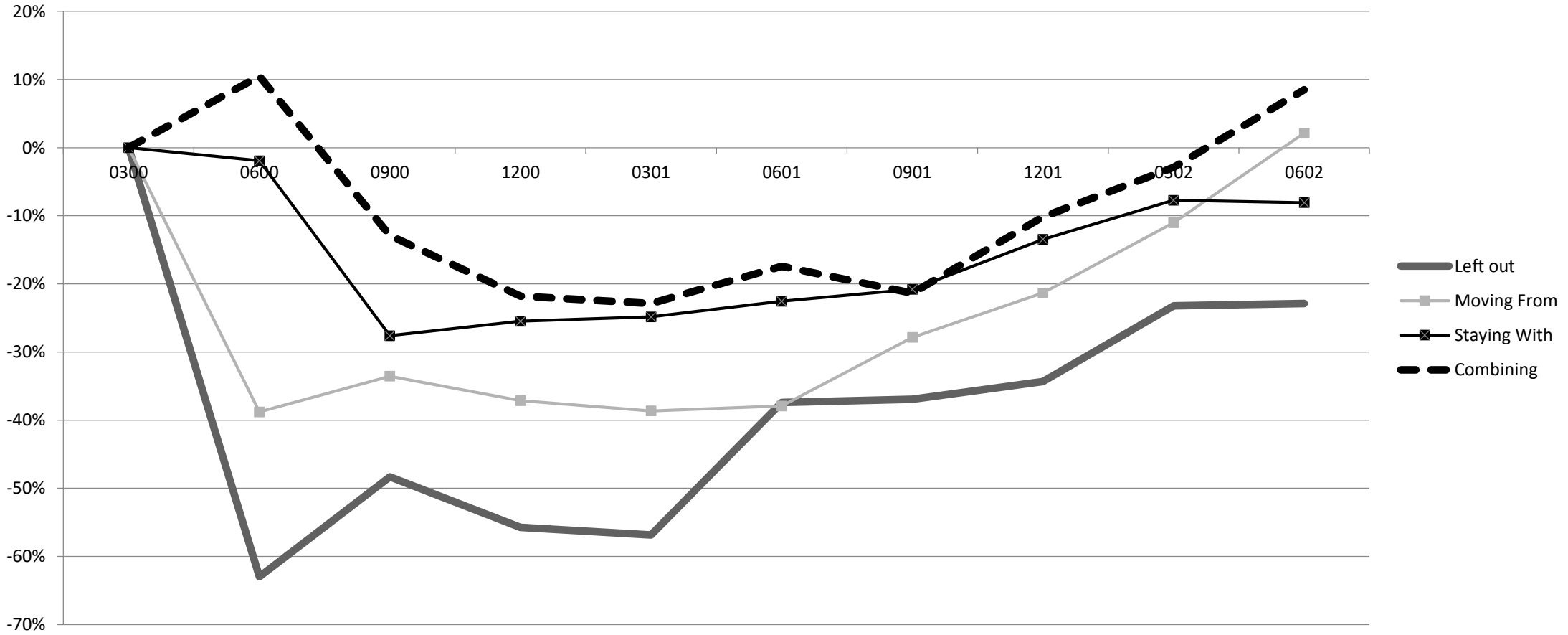
	Mean Milk L per HH per day	Average Variance per HH	Average Household coefficient of variation
Left Out	1.2	4.4	1.4
Moving From	1.6	6.2	1.2
Staying With	3.1	17.4	1.1
Combining	3.3	13.6	1.2
Significant difference in means by groups, t-statistics	t12 *, t13 ***, t14 ***, t23 **, t24 ***, t34	t12 , t13 ***, t14 **, t23 **, t24 *, t34	t12 , t13 **, t14 **, t23 , t24 , t34 ,

Figure 3.1 Lorenz curves of income and livestock distribution

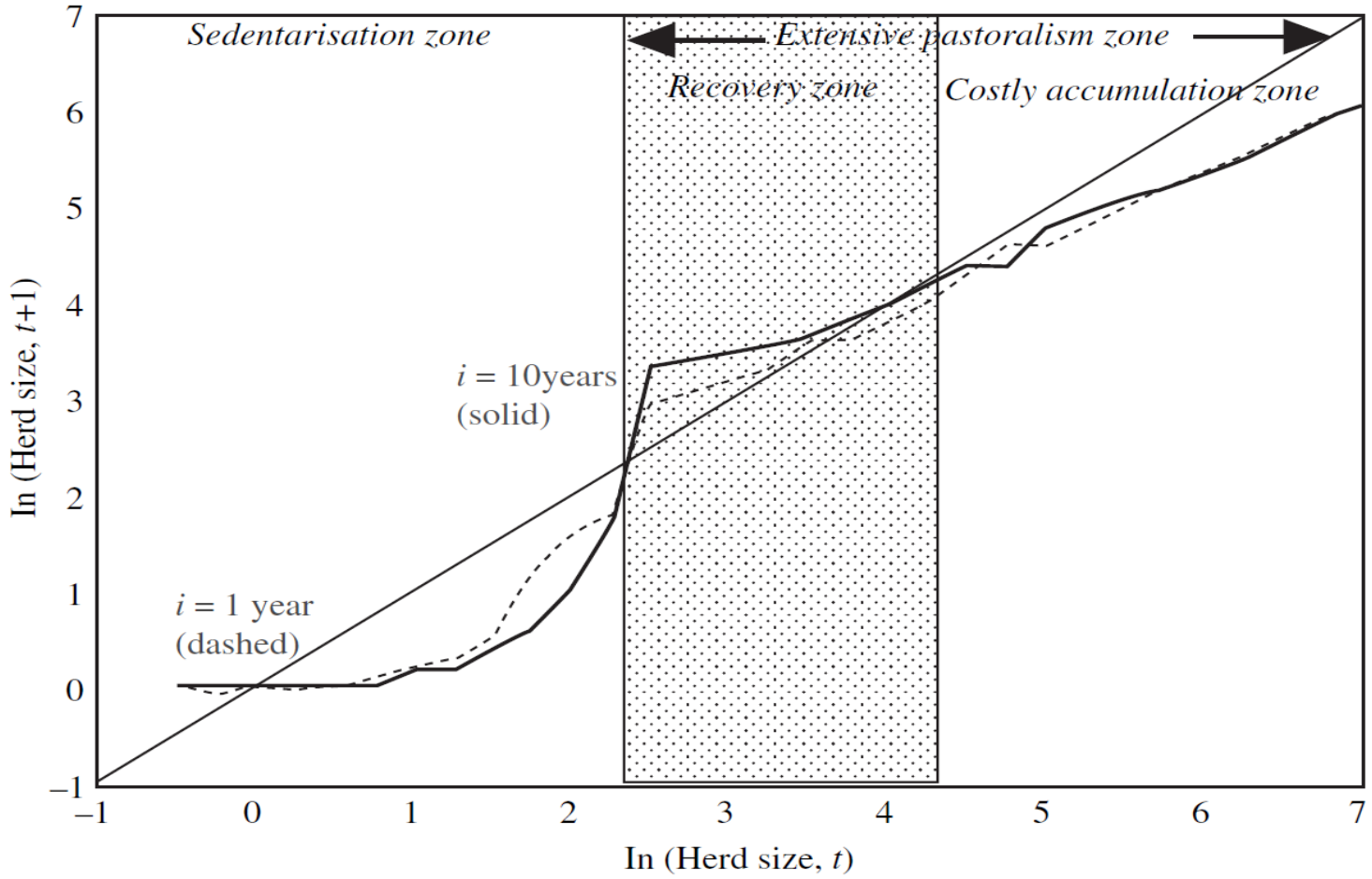


Source: McPeak, Little, and Doss (2012, 93).

Herd size: recovery over time



Lybbert et al. 2004



Nadaraya-Watson estimates using Epanechnikov kernel with bandwidth ($h = 1.5$)

Fig. 4. *Nonparametric Estimates of Expected Herd Size Transition Functions*

Mobility remains critical.

Table 4 presents data from Mali and Niger.
Turner et al. 2014

Table 3.1 presents data from Kenya.
Little and McPeak 2014

Table 4 Mobility averages by species and season across the 32 study villages

Species	Mobility category	Rainy season	Dry season
Cattle	Village territory	22 %	45 %
	<40 km from village	26 %	23 %
	>40 km from village	52 %	32 %
Goats	Village territory	33 %	56 %
	<40 km from village	27 %	22 %
	>40 km from village	40 %	22 %
Sheep	Village territory	34 %	53 %
	<40 km from village	25 %	21 %
	>40 km from village	41 %	26 %

Table 3.1 Herder mobility and drought impacts

	Average per capita livestock (TLUs) 2000–2002	% decline March–December 2000	Average # of watering points used each quarter	% of households relying on mobile satellite camps
Kargi	7.0	0%	3.3	88%
North Horr	3.6	–24%	1.7	45%
Logologo	2.5	–46%	2.0	91%
Sugata Marmar	1.1	–33%	1.3	28%
Dirib Gombo	1.0	–79%	1.1	46%
N'gambo	0.6	–50%	1.5	1%

Source: Based on Little et al. (2008, 599).

Note: TLU = tropical livestock unit.

Cultivation increasing restricting mobility:

Southern Ethiopia: Borana and Guji.

McPeak and Little 2018. USAID LAND project, data from 2014

Increasing trend towards establishing claims to land

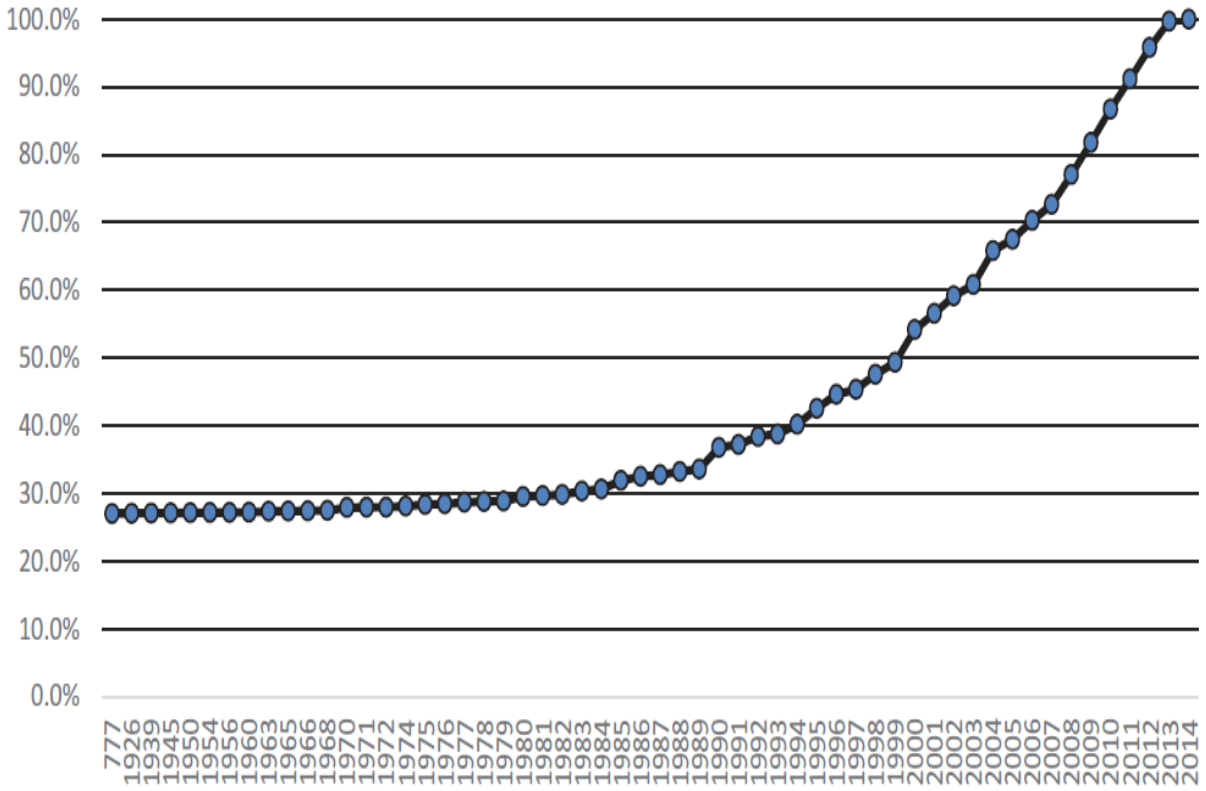


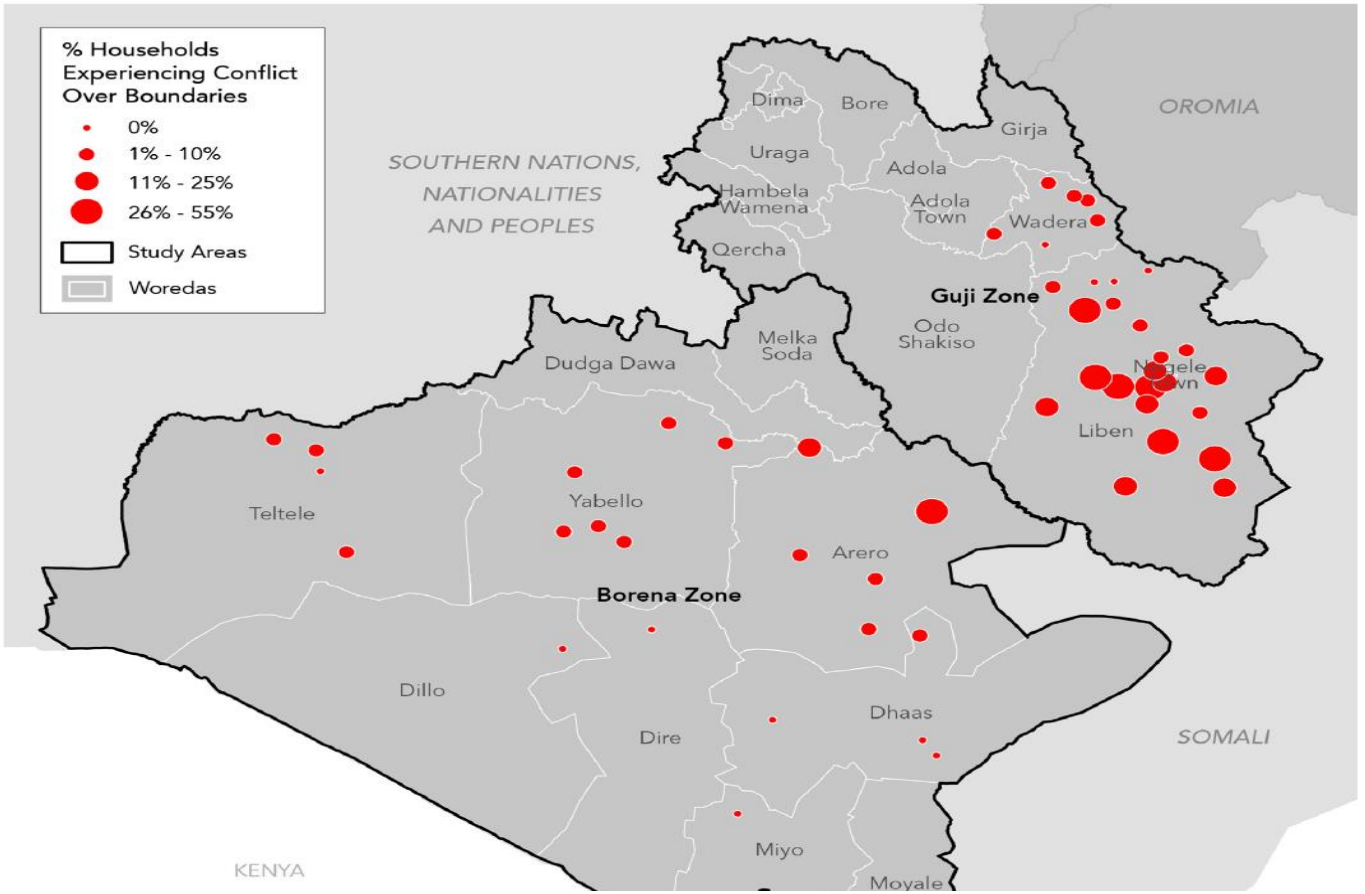
Figure 3. Cumulative per cent for when a cultivated plot was established.

Table 4. Share of plot area by use

	Cultivated	Fallow	Pasture	Rent
Wadera (Guji)	74.1%	24.4%	1.3%	0.2%
Gorodolo (Guji)	98.8%	1.2%	0.0%	0.0%
Liben (Guji)	57.3%	37.0%	5.7%	0.0%
Teltelle (Borana)	79.8%	13.8%	6.3%	0.0%
Yabello (Borana)	71.4%	20.4%	7.9%	0.3%
Arero (Borana)	73.6%	21.9%	4.6%	0.0%
Dhas (Borana)	65.2%	27.1%	7.7%	0.0%
Miyo (Borana)	64.1%	21.5%	14.3%	0.0%
Dirre (Borana)	32.3%	33.5%	34.1%	0.0%
Dillo (Borana)	38.1%	50.0%	11.9%	0.0%

Conflict Restricting Mobility

McPeak and Little, 2018. LAND project, Ethiopia



Conflict at interface of ethnic groups:
Borana, Guji, and Somali
But also Gabra, Arjun, Garre, Burji

Overuse of resources locally due to inability to access insecure rangelands.

Table 2
Who was asked to resolve this conflict by conflict type

	Boundary	Graze	Water	Raid	Crop	Forest	Privatization[a]	Salt
Elders	12%	33%	44%	28%	42%	37%	31%	50%
Gada	3%	15%	20%	5%	17%	30%	23%	0%
Government	75%	38%	33%	26%	14%	23%	23%	0%
Not resolved	9%	14%	4%	41%	28%	10%	23%	50%
Number of instances	379	136	55	39	36	30	13	2

[a] Refers to private enclosing of land for grazing and/or farming.

McPeak and Little 2018

Mobility and land use management: Local Conventions. RIVERS.

Transhumance corridors mapped in eastern Senegal. Turner et al. 2016

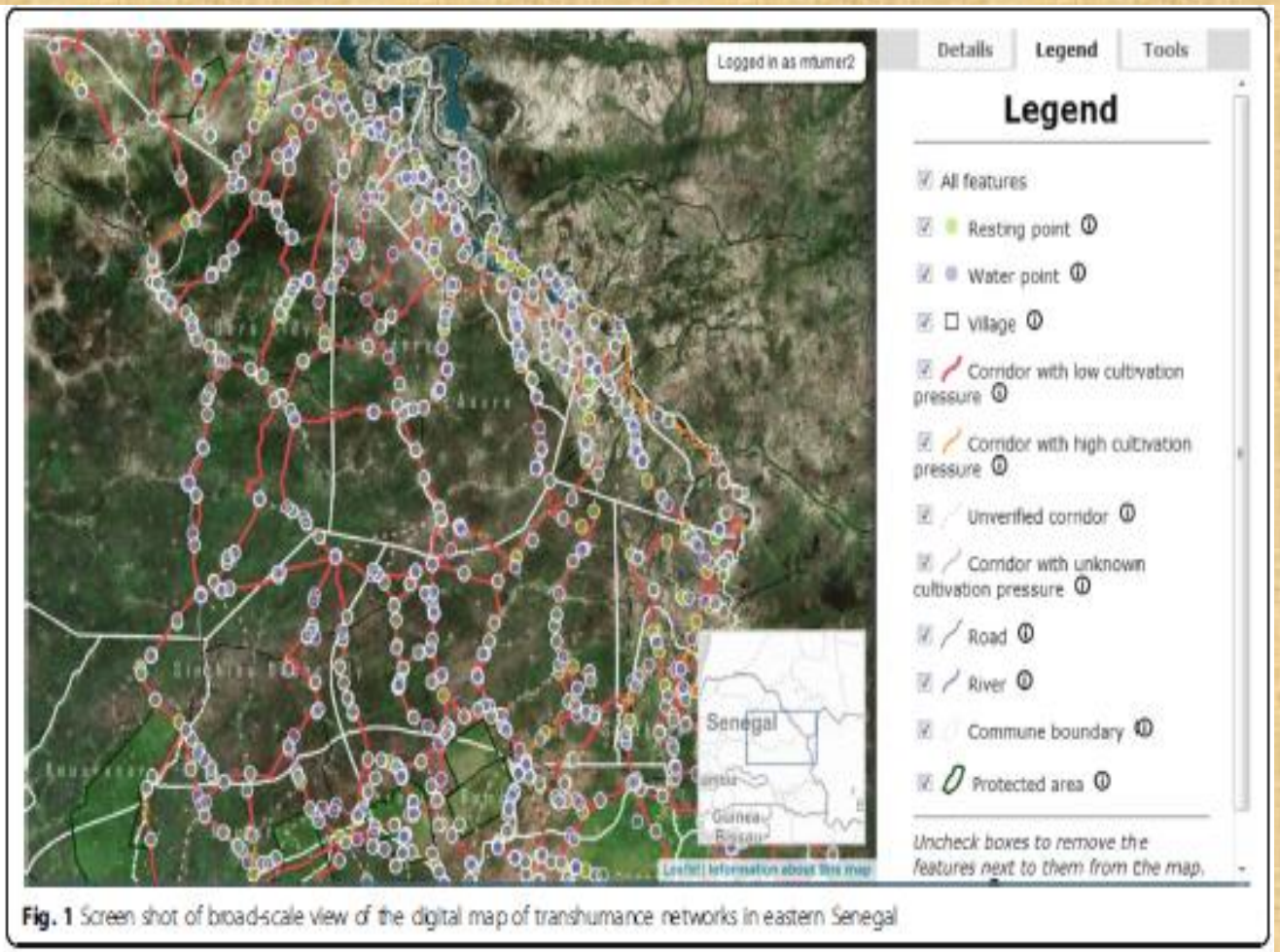


Fig. 1 Screen shot of broad-scale view of the digital map of transhumance networks in eastern Senegal

Participants setting up transhumance corridors in the communities of Sinthiou Fissa and Bélé , Senegal. Ba 2015

-Blue checker : villages from the Bélé and Sinthiou Fissa communities

-Green pipes : water points that cross several villages

-Red markers: Livestock track -transhumant corridors that are found along water points and pastures

-Clay box : temporary and permanent ponds

Transferred the web site to ISRA / PPZS, but currently down

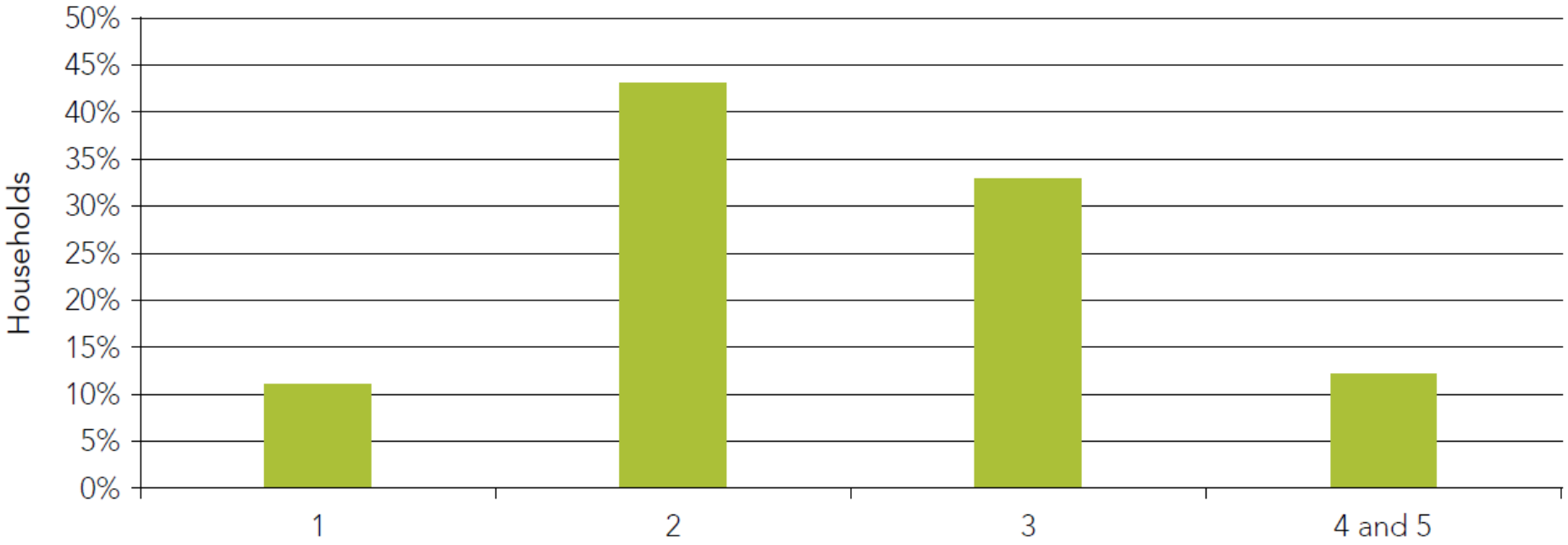
BRACED in Kaffrine Senegal and Mopti Mali, agropastoral population.

This data from 2015

Comment vous situez-vous sur l'échelle de résilience cette année?. Encercler le chiffre
How do you situate yourself on the resilience scale this year? Circle the number..

Très Faible= 1 Very Weak	Faible = 2 Weak	Ni Faible Ni Forte = 3 Neither weak nor strong	Forte = 4 Strong	Très Forte = 5 Very Strong

Figure 1: Percent of households reporting different resilience self-assessment values



Gender note:

The response by male head of households averaged 2.5.

The response by the wife of the head of household averaged 2.1.

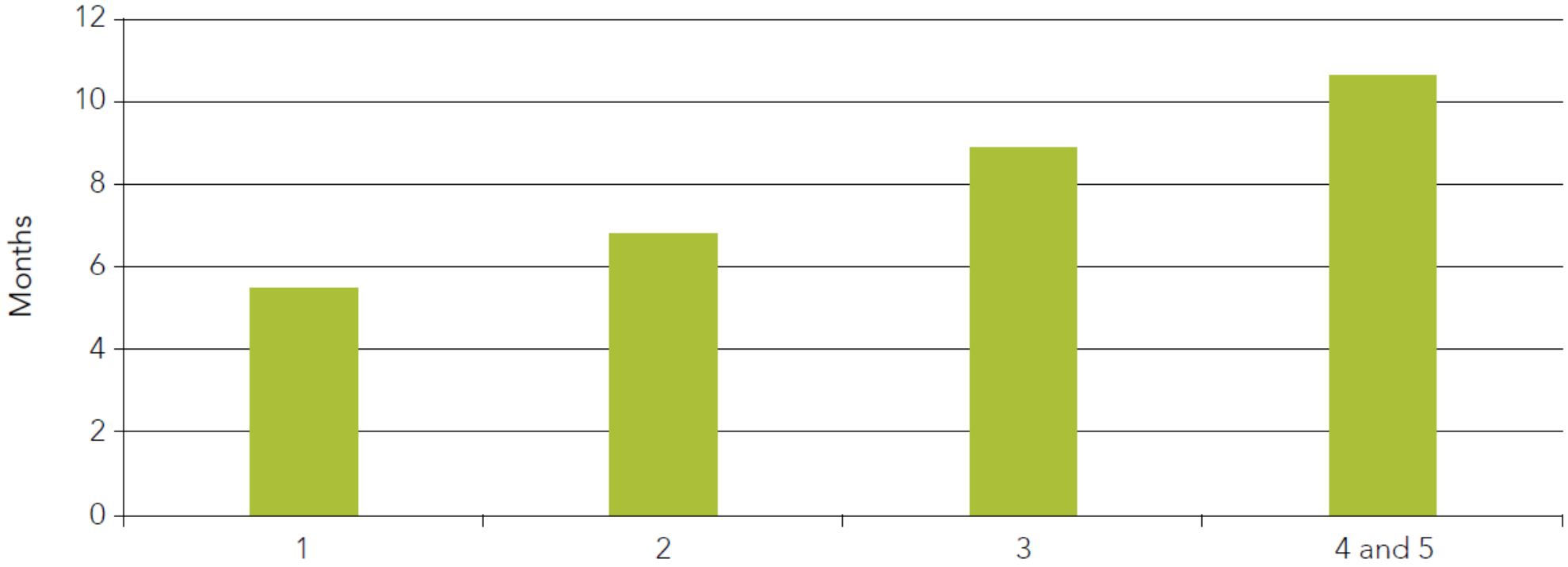
The difference is statistically significant.

McPeak et al. 2018

Followed linguistic research to find local language versions of 'resilience'.

Clear correlation between self-assessed resilience and food security

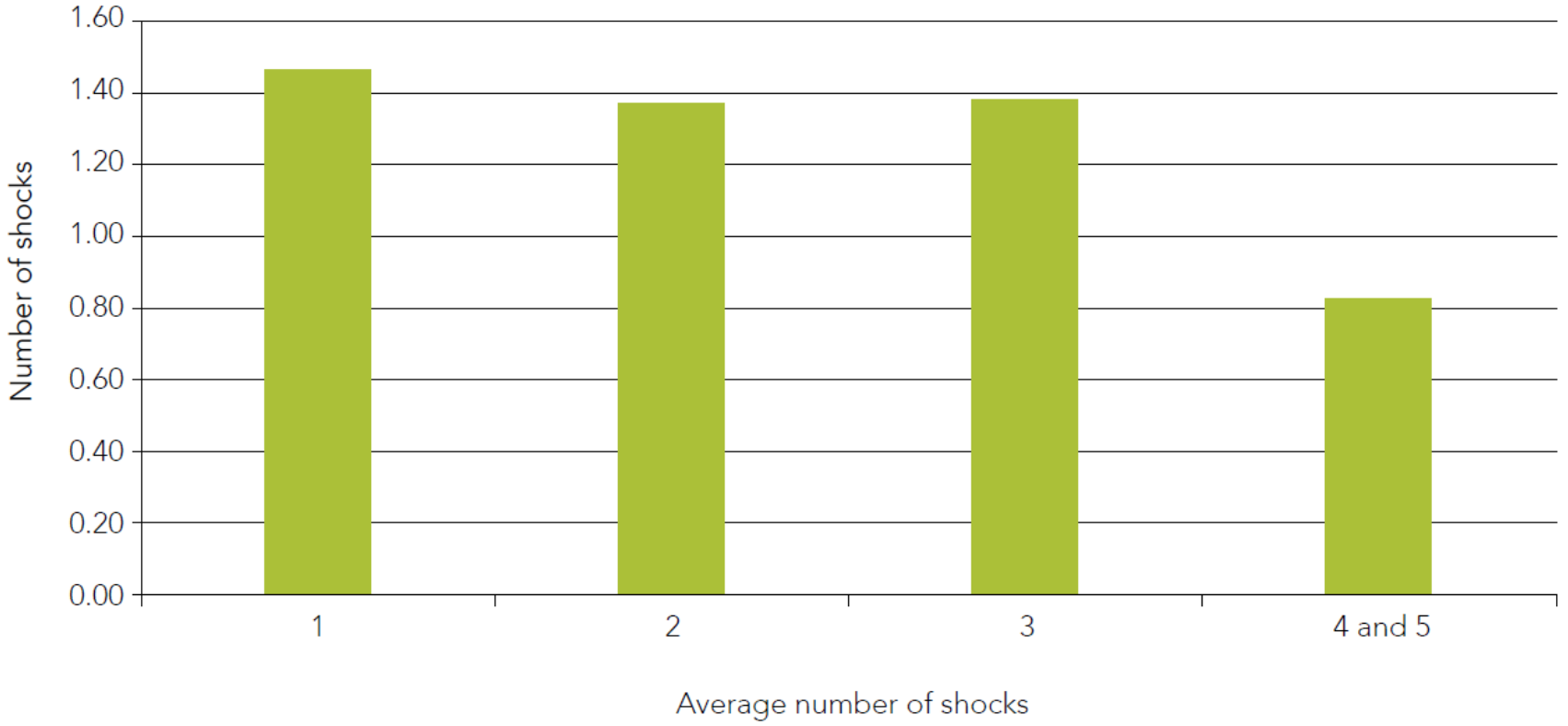
Figure 3: Mean months of food security (y-axis) for households sorted by resilience self-assessment (x-axis)



Shocks: in the past year how many shocks did your household experience?

Shocks are defined as fire in the household, violent winds, locust invasion, brush/ forest fires, drought, floods, or an open ended 'other'.

Figure 4: Average number of shocks (y-axis) experienced by households sorted by resilience self-assessment (x-axis)

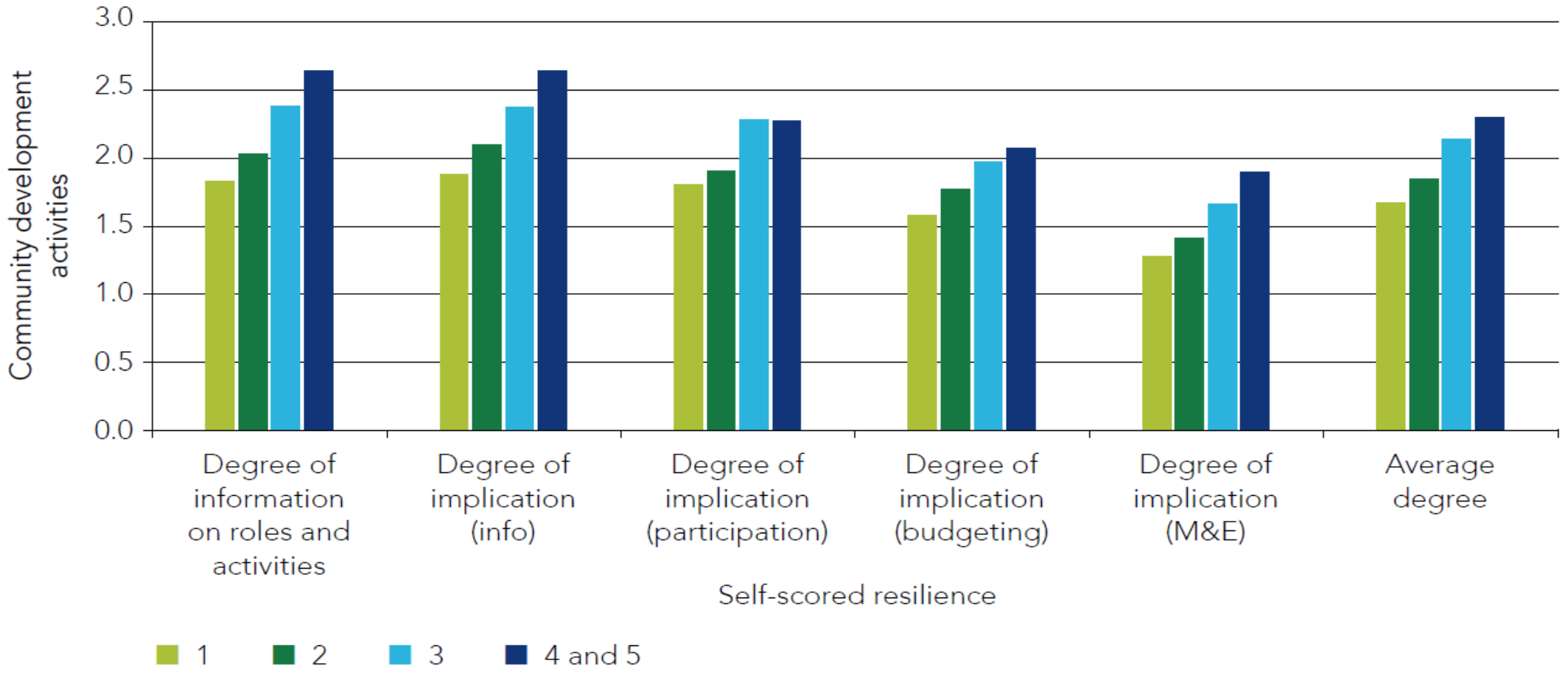


Question to work on with panel (2015, 2017, 2018):

Are they more resilient because they did not experience shocks or are they better able to avoid shocks because they are more resilient?

Involvement in community development activities. Likert 1-5 score

Figure 11: Degree of involvement in community development activities (y-axis) grouped by self-scored resilience on 1-5 scale (x-axis)



Returning to the PARIMA results for a few results of interest: differentiated Impacts on Health

	Percent of Observations with Negative Human Health Events in Drought	Percent of Observations with Negative Human Health Events in Recovery	Share of all livestock mortality due to disease shock.
1) Left Behind	27.0%	11.0%	31%
2) Combining	38.3%	15.8%	40%
3) Staying With	15.6%	11.5%	21%
4) Combining	23.8%	13.0%	27%
	t12 **, t13 ***, t14 , t23 ***, t24 ***, t34 **,	t12 , t13 , t14 , t23 , t24 , t34 ,	t12 , t13 *, t14 , t23 ***, t24 **, t34 ,

Differentiated market prices when selling livestock

	Price per TLU in Drought	Price per TLU in Recovery
1) Left Out	$86.23	$78.02
2) Moving From	$94.89	$125.78
3) Staying With	$85.64	$98.20
4) Combining	$81.19	$118.33
Significant difference in means by groups, t-statistics	t12 , t13 , t14 , t23 , t24 , t34 ,	t12 ***, t13 **, t14 ***, t23 *, t24 , t34 *,

Trying different measures of resilience:

Income? Assets? Bounce back to where they were? Bounce back to common thresholds?

Table 11 Average resilience indices, by sub-group (1 is most resilient, 0 is least resilient)

	Income recover resilience index	Income threshold resilience index	Asset recover resilience index	Asset threshold resilience index	Average threshold resilience index	Maximum threshold resilience index
1) Left out	0.827	0.156	0.464	0.035	0.095	0.172
2) Moving from	0.621	0.305	0.486	0.004	0.269	0.426
3) Staying with	0.608	0.237	0.444	0.302	0.154	0.307
4) Combining	0.533	0.531	0.425	0.446	0.488	0.658
Significant difference in means by groups, *t*-statistics	*t*12***, *t*13***, *t*14***, *t*23, *t*24, *t*34	*t*12, *t*13**, *t*14***, *t*23, *t*24***, *t*34***	*t*12, *t*13, *t*14, *t*23, *t*24, *t*34	*t*12***, *t*13*, *t*14***, *t*23***, *t*24**, *t*34***	*t*12***, *t*13*, *t*14***, *t*23***, *t*24**, *t*34***	*t*12***, *t*13*, *t*14***, *t*23***, *t*24**, *t*34***

***Significant difference at 1%, **significant difference at 5%, *significant difference at 10%

What fraction of the study period did it take you to recover is the basic idea (1 right away, 0 still not there by end)

Recover to where you were before the shock (income recover and asset recover) are not good ways of looking at resilience

The ‘common threshold’ measures seem to make more sense.

The contrast between income and assets as ways to measure resilience merits further analysis.

Information and intensification to enhance resilience in Mali
MLPI www.malibetail.net

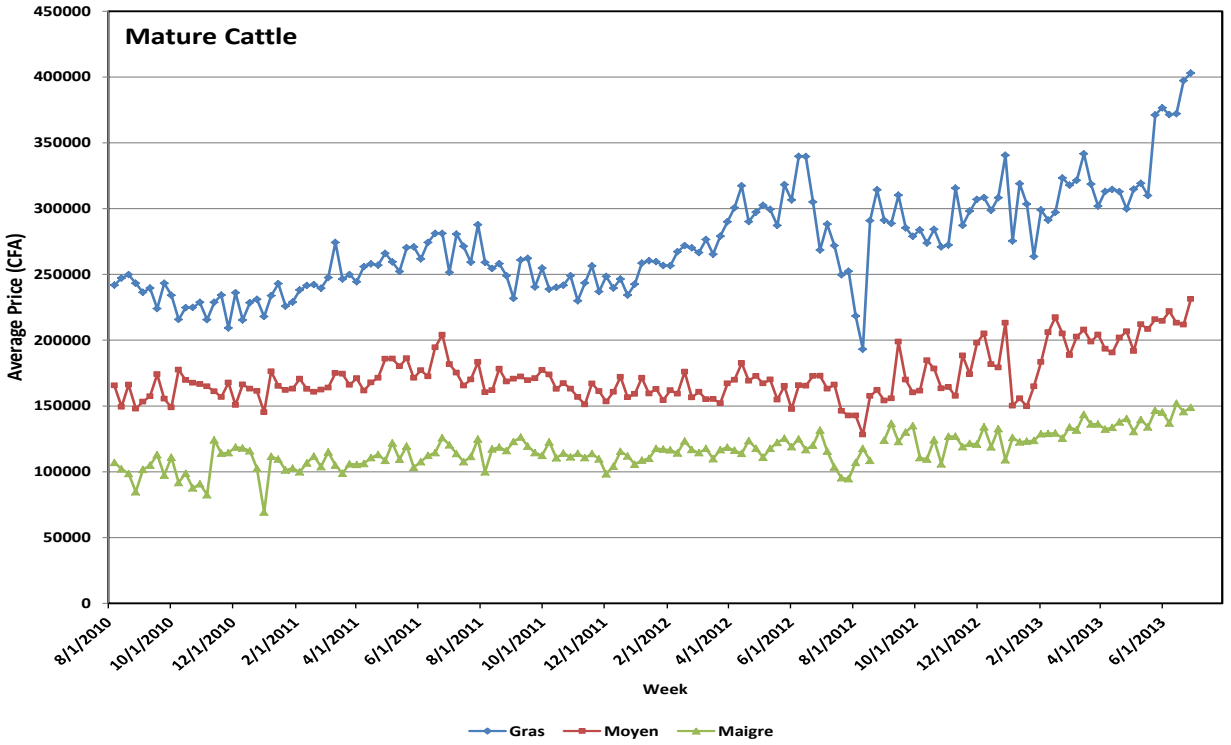


Table 3. Revenue gain due to fattening.

Site	Species	Buying price in FCFA* before fattening	Selling price in FCFA* after fattening	(Selling price – buying price)/ buying price
Mopti	Cattle	92,695	212,350	129%
Sofara	Cattle	91,995	166,380	81%
	Sheep	21,750	72,500	233%
	Goat	6,445	28,890	348%
Koro	Cattle	157,670	272,465	73%
	Sheep	47,185	83,320	77%

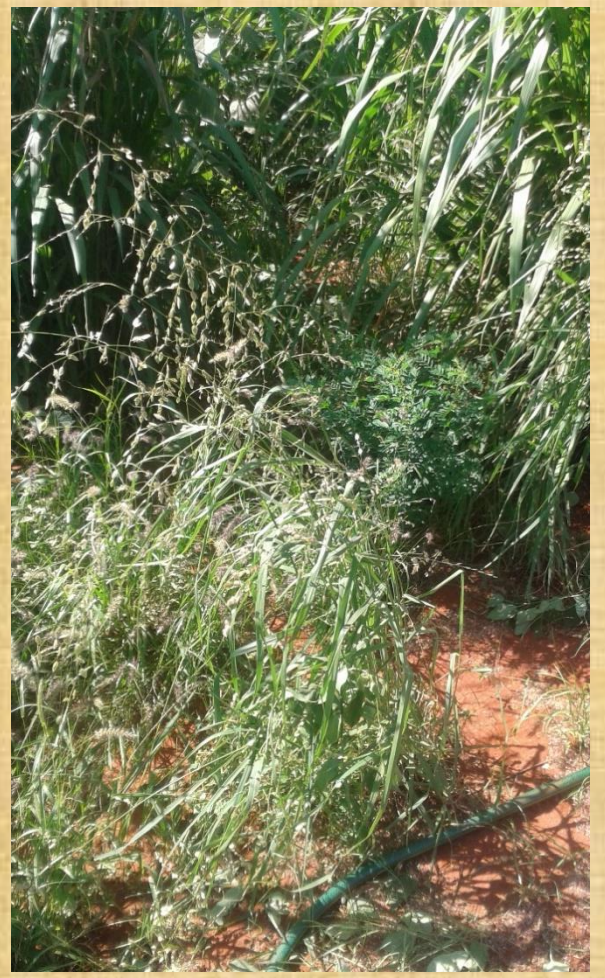
**USD 1.00 = approximately 450 FCFA.*

Table 4. Fattening cost estimates for cattle in the three sites.

Site	Feeds per day (kg)	Average No. of days	Cost of feed per kg (FCFA*)	Feed cost per day (FCFA*)	Feed cost for fattening	Feed costs as a percentage of value added (selling price - buying price)
Mopti	14	66	81	1,168	77,088 CFA*	64%
Sofara	17	65	57	957	62,205 CFA*	84%
Koro	10	181	58	609	110,229 CFA*	96%

**USD 1.00 = approximately 450 FCFA.*

Fodders in Wajir, Kenya



Currently seeking to fund research on least cost rations and fodder production.

Three different purposes.

1) Animal fattening
2) Dairy intensification
3) Supply feeds during drought in conjunction with Index Based Livestock Insurance (IBLI)

Innovation with Index Based Livestock Insurance . BASIS / AMA CRSP

- Pilot in Kenya, now in Ethiopia as well
- Design and extension in 2008
- First offered in 2009
- Design evolving as we learn
- Household longitudinal study with six years of data for Kenya, four years of data for Ethiopia.
- Analysis of survey data to improve contract design
- It continues to be offered and we hope improved
- Could it make livestock wealth visible as collateral?
- Knowledge and understanding require extension

2008 Game Play, Karare Kenya, Index Based Livestock Insurance Project

Jensen et al. (2018) find people who played the game had better understanding of the product.

Conclusion

- Value added processing is an opportunity that we can support with applied research for development.
- Livestock protection rather than replacement makes insurance more affordable
- Mobility is critical and without it the livestock production system will not function as it does now
  - Trends move against mobility
  - Policy can support mobility
- Markets have operated to move livestock from producers to consumers and there is an existing marketing infrastructure
  - We can make that system more efficient with support
  - Revenue sharing models are being tested.
  - Demand will continue to grow
    - More animals?
    - More meat from the same number of animals?