



Food and Agriculture Organization
of the United Nations

Coping with climate shocks: The role of the livestock portfolio as resilience mechanism

Generating empirical evidence to guide public spending in agriculture

Livestock Policy Lab (LPL)

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Livestock Policy Lab (LPL)



Bridging the gap between policy, research and practice

The LPL is a multi-stakeholders platform that serve interface to support the identification of evidence based policy instruments to enhance the contribution of the livestock sector to the achievement of the SDGs.



Main arguments

Policy argument

The lack of robust livestock related empirical evidences is having serious policy implications, leading to:

- A gap in the design and adoption of livestock policy instruments.
- Reluctance among decisions makers outside the sector.
- Low public spending on livestock related social-protection mechanisms.

Methodological argument

Previous studies have employed the Tropical Livestock Unit (TLU) index as proxy of livestock assets.

- The aggregated use of the TLU index in policy analysis underestimates the contribution of the livestock portfolio to consumption, income, and resilience.

Relevance



- By 2030, build the resilience of the poor and reduce their vulnerability to climate-related extreme events and other economic, social and environmental shocks.



- By 2030, end hunger and ensure access by all people, in particular the poor, to safe, nutritious and sufficient food all year round.



- A survey of 165 NDCs shows that nearly half of them include a livestock component, and 80% of those components are related to adaptation activities.

Background

Dealing with external shocks can be extremely difficult for low equipped households



Background



It has been long suggested that households keeping livestock are more resilient to crises.

However the evidence is generally mix, contrasting and mostly based on case studies.

Contrasting evidence

- Hänke and Barkmann (2017), highlight the role of livestock assets, as coping strategy to compensate for income losses.
- McPeak (2017), shows that the insurance function of livestock can be limited by the correlation of climate shocks and asset shocks.
- Fafchamps and Lund (2003), found a insignificant effect of livestock assets in smoothing consumption in response to income losses.
- Kazianga and Udry (2006), examine the food consumption consequences of a severe drought, finding no evidence that livestock served as buffer mechanism.

Motivation



How significant are livestock assets as resilience strategy for rural households?

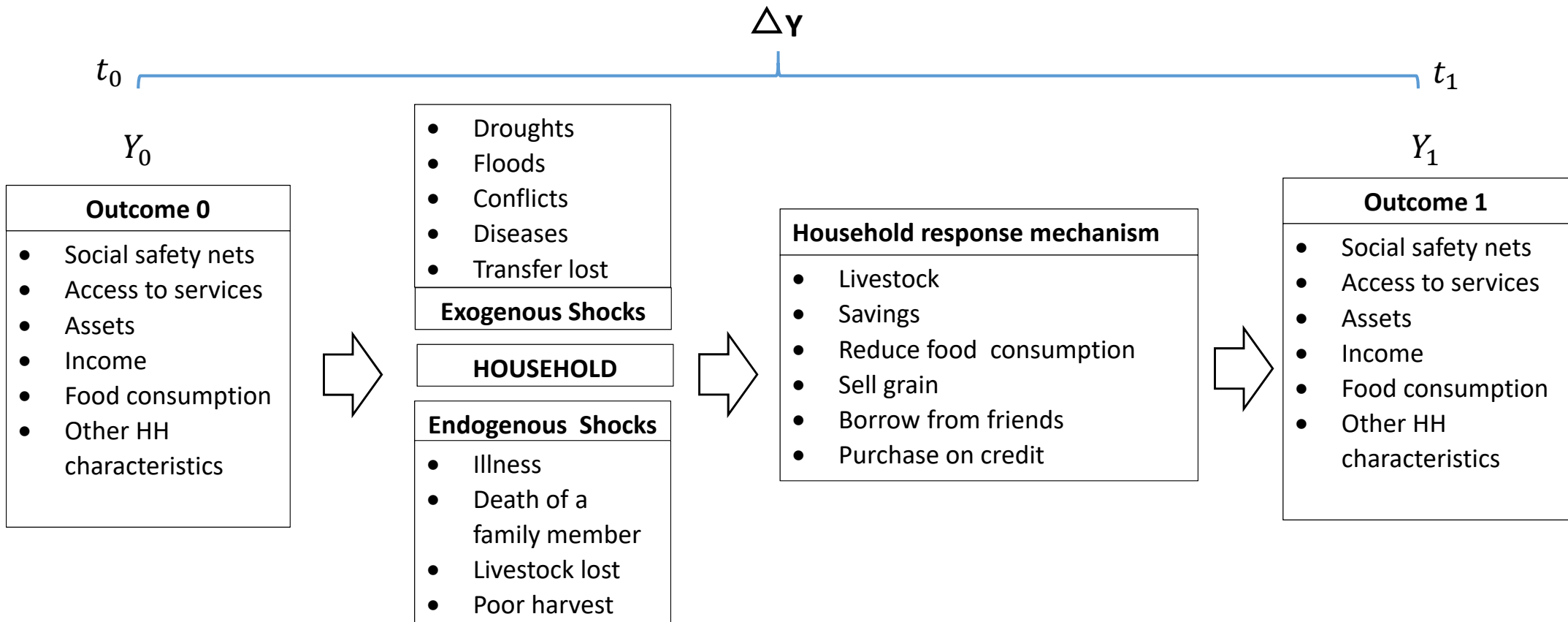
Objective

Assess the role of livestock assets, in particular small-ruminants, as ex-ante coping strategy against external shocks.

- 232.372 households surveys (LSMS)
- 19 developing countries



Framework



*“The capacity of a household to bounce back to previous level of well-being after a shock”
(Béné, 2013).*

FAO Smallholders Dataportrait (ESA)

The Smallholder Farmers' Dataportrait is a comprehensive, systematic and standardized data set on the profile of smallholder farmers across the world.

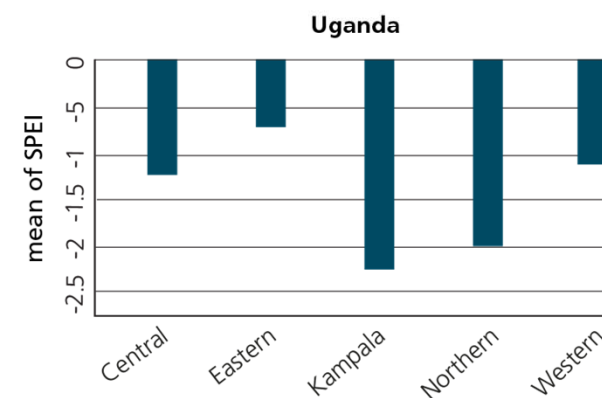
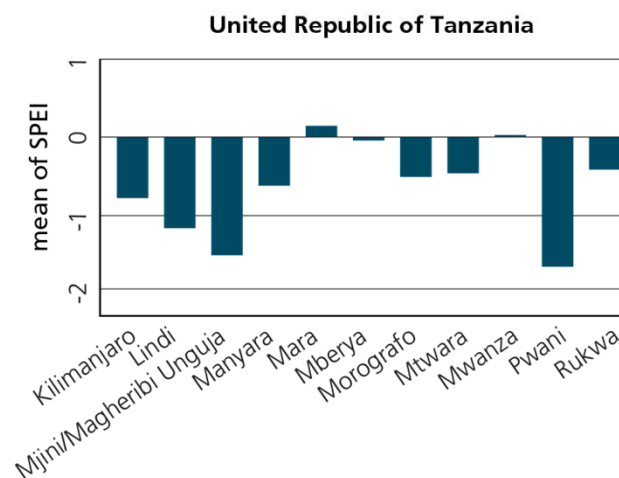
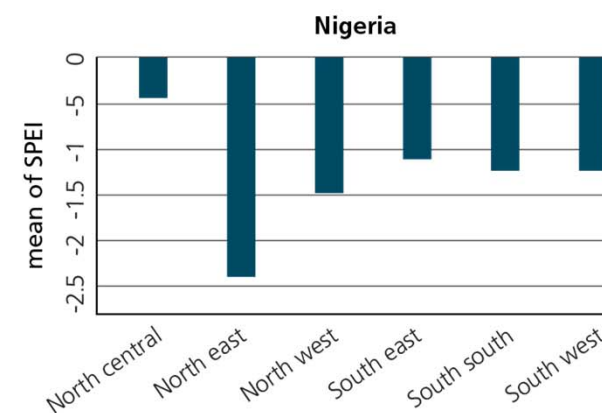
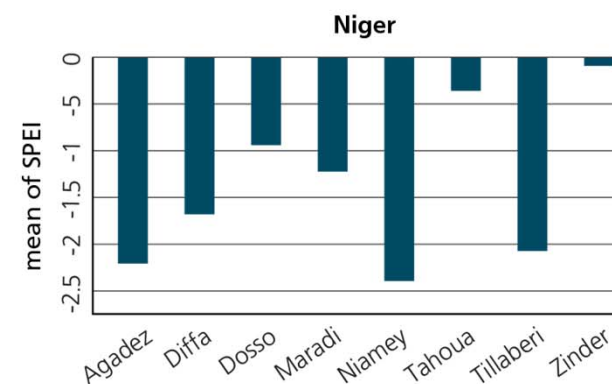
Tropical Livestock Units (TLU)

- Cattle
- Camels
- Small ruminants
- Poultry
- Pigs
- Other

Data

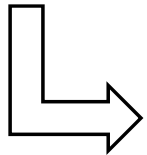
Standard Precipitation and Evapotranspiration Index (SPEI)

- Date
- Location
- Magnitude

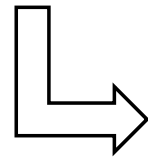


Research strategy

1. What is the effect of a climate shock on a rural household's food consumption and income level?



2. Are households' owning livestock assets more resilient to climate shocks?



3. Does the desegregation of the livestock portfolio have a significant statistical effect?

$$\ln(O_{it}) = \alpha_i + t_t + \overset{1}{\beta_1 SPEI_{it}} + \beta_2 TLU_{it} + \overset{2}{\beta_3 SPEI_{it} * TLU_{it}} + \beta_4 TLUL_{it} + \overset{3}{\beta_5 SPEI_{it} * TLUL_{it}} + \beta_6 TLUS_{it} + \beta_7 SPEI_{it} * TLUS_{it} + \beta_8 TLUP_{it} + \beta_9 SPEI_{it} * TLUP_{it} + \beta_{10} TLUC_{it} + \beta_{11} SPEI_{it} * TLUC_{it} + \gamma_{it} X_{it} + \varepsilon_{it}$$

Results

| Income | Full Sample | Quantile 1 | Quantile 2 | Quantile 3 | Quantile 4 | Quantile 5 |
|--------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|
| SPEI | -0.245*** [0.022] | -0.244*** [0.022] | -0.270*** [0.018] | -0.267*** [0.017] | -0.232*** [0.021] | -0.247** [0.104] |
| SPEI* TLU | 0.035 [0.023] | 0.054 [0.035] | 0.038 [0.028] | 0.033 [0.027] | 0.025 [0.032] | 0.144 [0.165] |
| SEPI*TLUL | -0.001 [0.029] | -0.040 [0.039] | -0.030 [0.032] | -0.017 [0.031] | -0.022 [0.037] | -0.119 [0.187] |
| SPEI*TLUS | 0.234*** [0.058] | 0.188*** [0.065] | 0.168*** [0.053] | 0.175*** [0.052] | 0.142** [0.061] | 0.539* [0.310] |
| SPEI*TLUP | 0.098 [0.070] | -0.019 [0.090] | -0.007 [0.074] | -0.010 [0.071] | 0.013 [0.084] | 0.238 [0.429] |
| SPEI*TLUC | 1.385*** [0.433] | 1.544*** [0.182] | 1.923*** [0.149] | 1.933*** [0.144] | 1.926*** [0.171] | -0.274 [0.867] |
| Observations | 136,405 | 136,405 | 136,405 | 136,405 | 136,405 | 136,405 |

Robust standard errors in brackets. ***p<0.01, **p<0.05, *p<0.1

Source: Acosta & Nicolli, 2019

Results

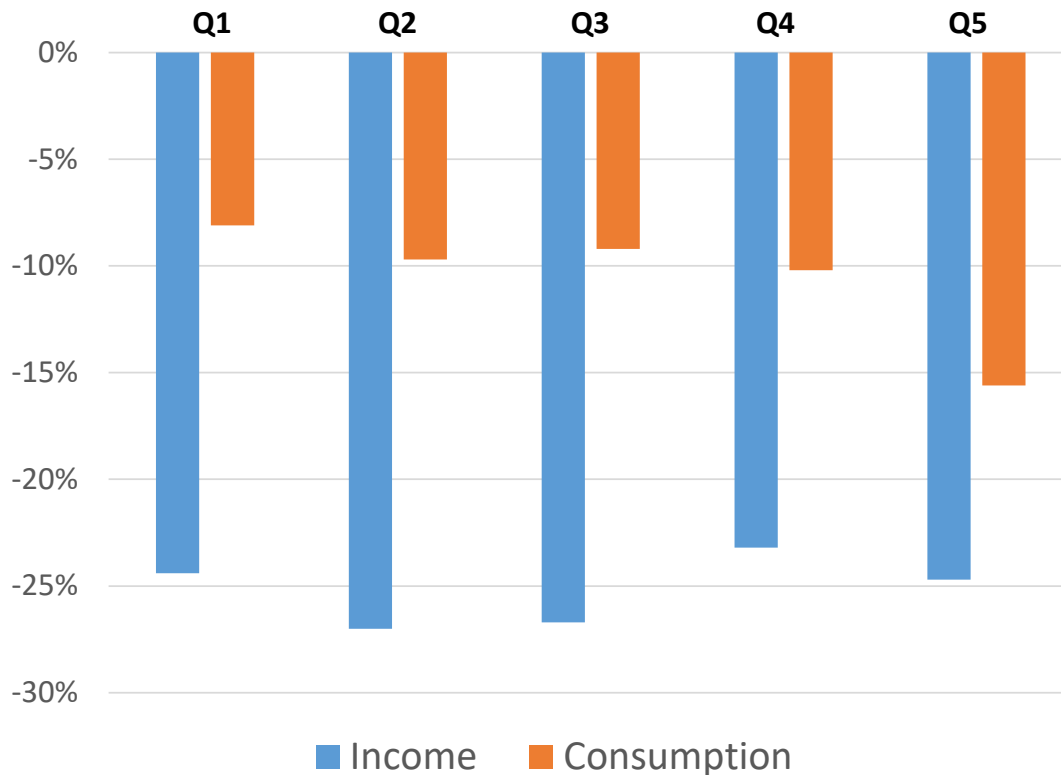
| Consumption | Full Sample | Quantile 1 | Quantile 2 | Quantile 3 | Quantile 4 | Quantile 5 |
|--------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| SPEI | -0.082*** [0.011] | -0.081*** [0.012] | -0.097*** [0.010] | -0.092*** [0.011] | -0.102*** [0.013] | -0.156*** [0.034] |
| SPEI* TLU | 0.020* [0.012] | 0.021 [0.019] | 0.019 [0.016] | 0.024 [0.017] | 0.026 [0.021] | 0.073 [0.054] |
| SEPI*TLUL | -0.016 [0.013] | -0.015 [0.021] | -0.013 [0.018] | -0.020 [0.019] | -0.029 [0.024] | -0.117* [0.062] |
| SPEI*TLUS | 0.100*** [0.027] | 0.104*** [0.035] | 0.105*** [0.031] | 0.090*** [0.032] | 0.081** [0.039] | -0.009 [0.102] |
| SPEI*TLUP | 0.075** [0.032] | 0.082* [0.049] | 0.119*** [0.042] | 0.036 [0.044] | -0.003 [0.054] | 0.222 [0.142] |
| SPEI*TLUC | 0.851*** [0.172] | 1.038*** [0.098] | 1.108*** [0.085] | 0.962*** [0.089] | 0.975*** [0.109] | 0.497* [0.284] |
| Observations | 137,693 | 137,693 | 137,693 | 137,693 | 137,693 | 137,693 |

Robust standard errors in brackets. ***p<0.01, **p<0.05, *p<0.1

Source: Acosta & Nicolli, 2019

Results

Effects of a severe drought on rural households consumption and income

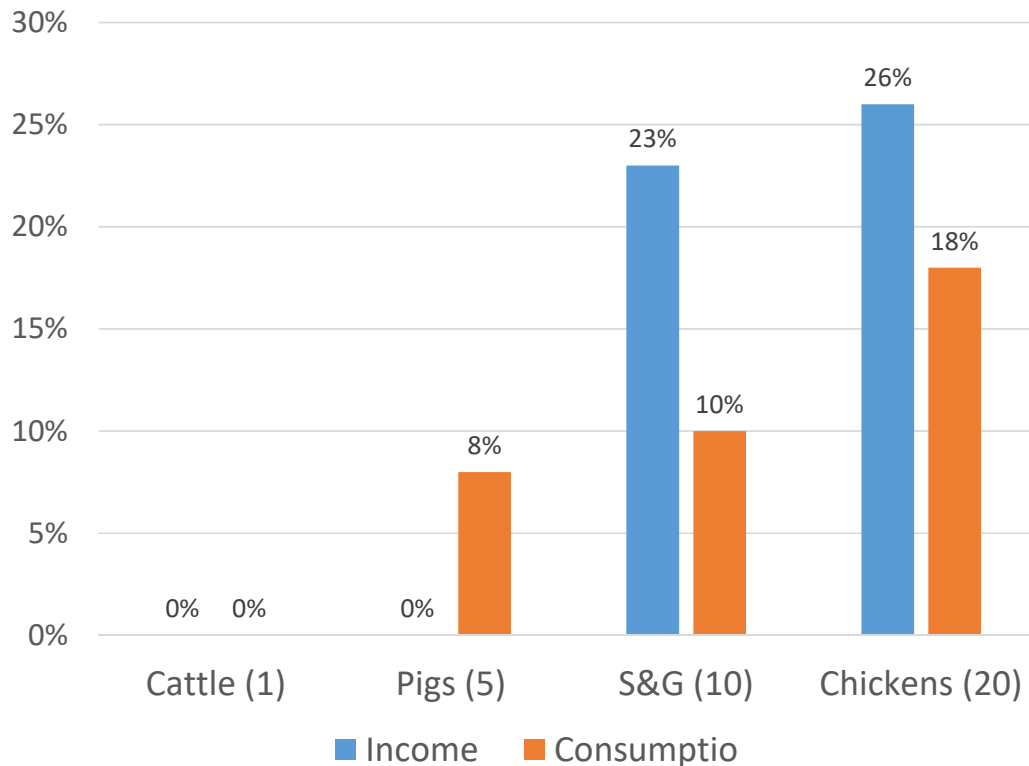


A decrease of one standard deviation in the SPEI can reduce by 25% and by 8% the level of income and food consumption of a rural household.

Source: Acosta & Nicolli, 2019

Results

Effects of a livestock assets as resilience mechanism



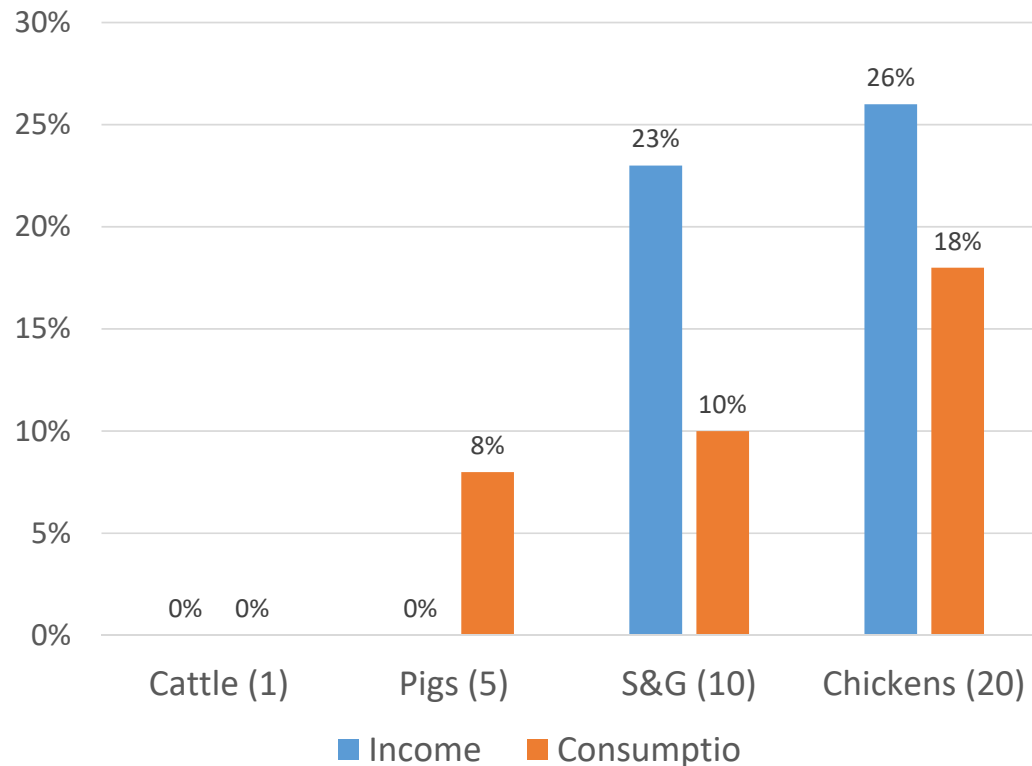
Livestock assets have a significant effect in increasing the resilience capacity of rural households, against climate shocks.

However the composition of the livestock portfolio matters!

Source: Acosta & Nicolli, 2019

Results

Effects of a livestock assets as resilience mechanism



Source: Acosta & Nicolli, 2019

The income and consumption effects of a severe climate shock can be fully mitigated by owning:

- 10 sheep or goats.
- 20 chickens.

Policy implications

- Strengthening households' resilience will be fundamental to eradicate poverty and end hunger.
- A climate shock can reduce by 25% and by 8% the level of income and food consumption of a rural household.
- A diversified livestock portfolio can strengthen significantly the resilience capacity of households against severe climate shocks.
- However, the lack of robust empirical evidence might be leading to a gap in the design of policy instruments and allocation of public spending.



Food for thought

- What would be the level of public spending needed to achieve a similar result through a different policy mechanism?
- Are national extension and veterinary services capturing the wider welfare effects of their interventions?
- Would this evidence support an allocation of public spending more aligned with their broader contribution?
- Could the generation of robust empirical evidence support a better allocation of public spending and the mobilization of resources?

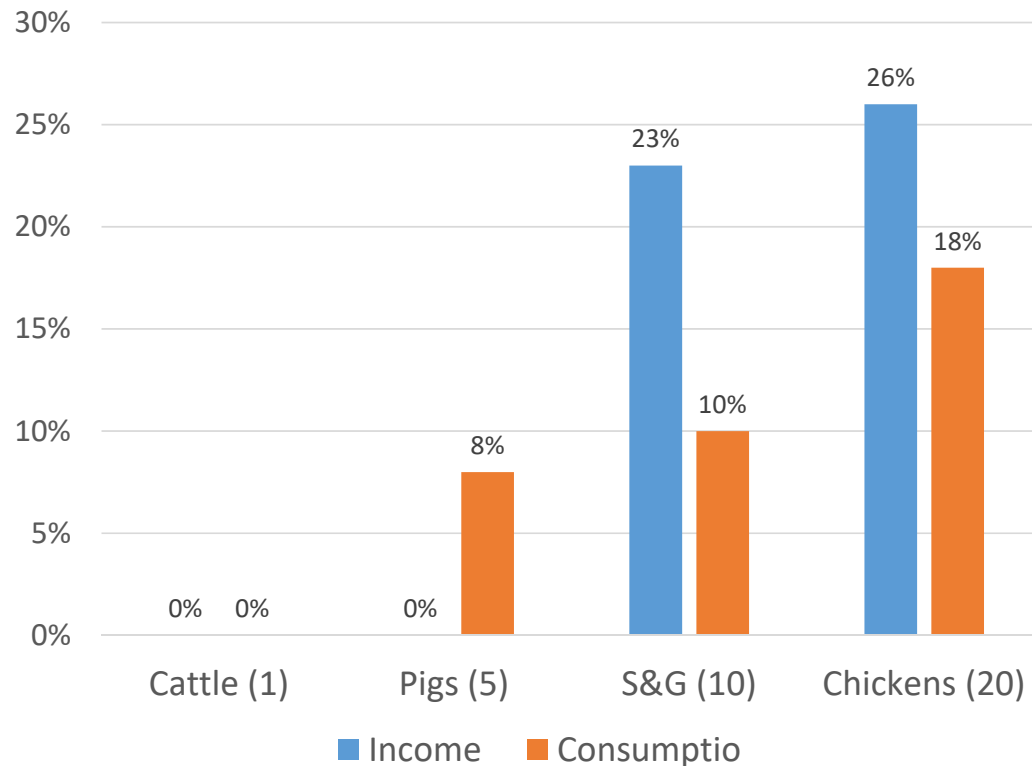


Thank you

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Results

Effects of a livestock assets as resilience mechanism



The livestock portfolio have a significant effect in increasing the resilience capacity of rural households, against a severe climate shocks.

Source: Acosta & Nicolli, 2019