GLOBAL LIVESTOCK CRSP

Herd Accumulation: A Pastoral Strategy to Reduce Risk Exposure

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Herd loss is one of the major risk factors in our study sites. As found throughout pastoral areas in Africa, sudden widespread herd loss is an ever present risk facing pastoral producers. We illustrate using data gathered from households in 11 sites in northern Kenya and southern Ethiopia one such incidence of sudden widespread herd loss that occurred in this area in 1999-2000. We investigate the hypothesis that pastoralists adopt a household level herd accumulation strategy during non-crisis periods as a means to reduce exposure to risks associated with herd loss. Herd accumulation pre-crisis increases the prospects that a household will have a viable herd post crisis. The evidence PARIMA has gathered confirms that larger household herd size pre-crisis is positively related to larger expected household herd size post-crisis. This suggests that policy efforts that attempt to limit herd accumulation at the household level but do not address the underlying risk of herd loss may be of questionable wisdom.

Background

Although there are 10 pastoral ethnic groups and two different countries within our study area, one unifying factor confronting the production systems in our eleven sites is the existence of sudden, covariate herd losses that occur with some frequency. As the PARIMA project is focused on issues of pastoral risk management, it is critical that we develop a more nuanced understanding of the role herd accumulation plays at the household level as a form of self insurance, and the implications of this role for pastoral development strategies in pastoral east Africa.

While the tendency of pastoral households to accumulate livestock has been attributed to cultural factors (Herskovits, 1926; Doran, Low, and Kemp 1979) or common property tenure arrangements (Jarvis 1980), there is growing awareness that herd accumulation is a rational self-insurance strategy to follow in an uncertain production environment (Sanford 1983, McPeak and Barrett 2001, McPeak 2003, McPeak forthcoming, Lybbert et al. forthcoming). The results presented below illustrate the simple, but powerful logic of this strategy. Assuming that periodic herd die-offs are inevitable in this production environment, and expected post crisis herd size is an increasing function of pre-crisis herd size, herd accumulation is an effective risk management strategy followed by pastoral households.

The PARIMA project has been gathering data since 1998 using a variety of different methodologies to better understand the current effectiveness of traditional pastoral risk management strategies. The household level data used in this brief were gathered as part of an ongoing longitudinal study of over 300 households in northern Kenya and Ethiopia. The results presented in this brief focus on four northern Kenya sites during the crisis period of June 2000 to December 2000[1], and five Ethiopian sites during the period June 1999 to December 2000[2].

Preliminary Results

Herd loss is one of the major risk factors in the pastoral systems. However, there is great variation in how this risk is experienced in the study area during our survey period. Our study showed average household herd loss of as high as 77% in one site in Ethiopia and as low as 21% in one of the northern Kenyan sites. In addition, there were differences in when the losses were suffered. In general, the losses occurred in the Ethiopian sites prior to the losses in the Kenya sites.

The evidence PARIMA has gathered clearly indicates that herd accumulation pre-crisis serves as an effective means of pastoral risk management at the household level in most of our study sites. Consider figures one and two[3]. Figure one simulates regression results obtained

by regressing household herd size in December 2000 on household herd size in June 1999 and its square for five Ethiopian sites[4] over the range of herd sizes commonly held in each site. Figure two simulates regression results obtained by regressing household herd size in December 2000 on household herd size in June 2000 and its square for four Kenyan sites[5] over the range of herd sizes commonly held in each site.

For all but one of the sites, post-crisis herd size is an increasing function of pre-crisis herd size over the entire range of pre-crisis herd size. In the one case where this is not true, Dirib Gumbo, only 15% of households had herd sizes that fall in the decreasing zone of the graph[6]. Overall, accumulating animals at the household level is a viable strategy for confronting the risk of herd loss in all sites and over the range of herd sizes for almost our entire sample.

Practical Implications

Given weaknesses in the existing financial and marketing systems in the rangelands of northern Kenya and southern Ethiopia, herd accumulation remains the primary and most effective means of risk management for pastoralists. Efforts to stimulate development in these areas must take care not to disrupt pastoralists' capacity to make use of these traditional methods, or else unintended harm may result. For example, any attempt to limit herd accumulation could have negative consequences for household risk exposure if no attempt is made to address the risk that herd accumulation confronts.

Limiting herd accumulation can be sensible if it reduces the risk of sudden herd loss. However, it remains an open question as to the cause of this risk of sudden herd loss. Is sudden covariate herd loss due to climatic conditions? Is loss triggered by livestock diseases? Is aggregate herd size surpassing carrying condition to blame? Is it some complex interaction of these and perhaps other underlying factors? A key topic for further research is to identify why sudden herd loss occurs, so that policy can be expressly designed to help reduce this risk factor[7]. However, until such understanding is developed, it is important to recognize that household herd accumulation is a critical component of household self insurance against such losses and that policy intervention for pastoral areas must be designed in cognizance of this fact.

Footnotes

[1]As the focus of this brief is on risk management, we select these four sites since they experienced a crisis during this period that impacted herd size. Paired t-test analysis indicates mean herd size declined significantly in Dirib Gumbo (t=5.43), Kargi (t=3.50), Logologo (t=4.08), and

Figure 1. Simulation of regression results for herd size post crisis as a function of herd size pre crisis in Ethiopia.
Herd size in December 2000 as a function of June 1999 Herd Size

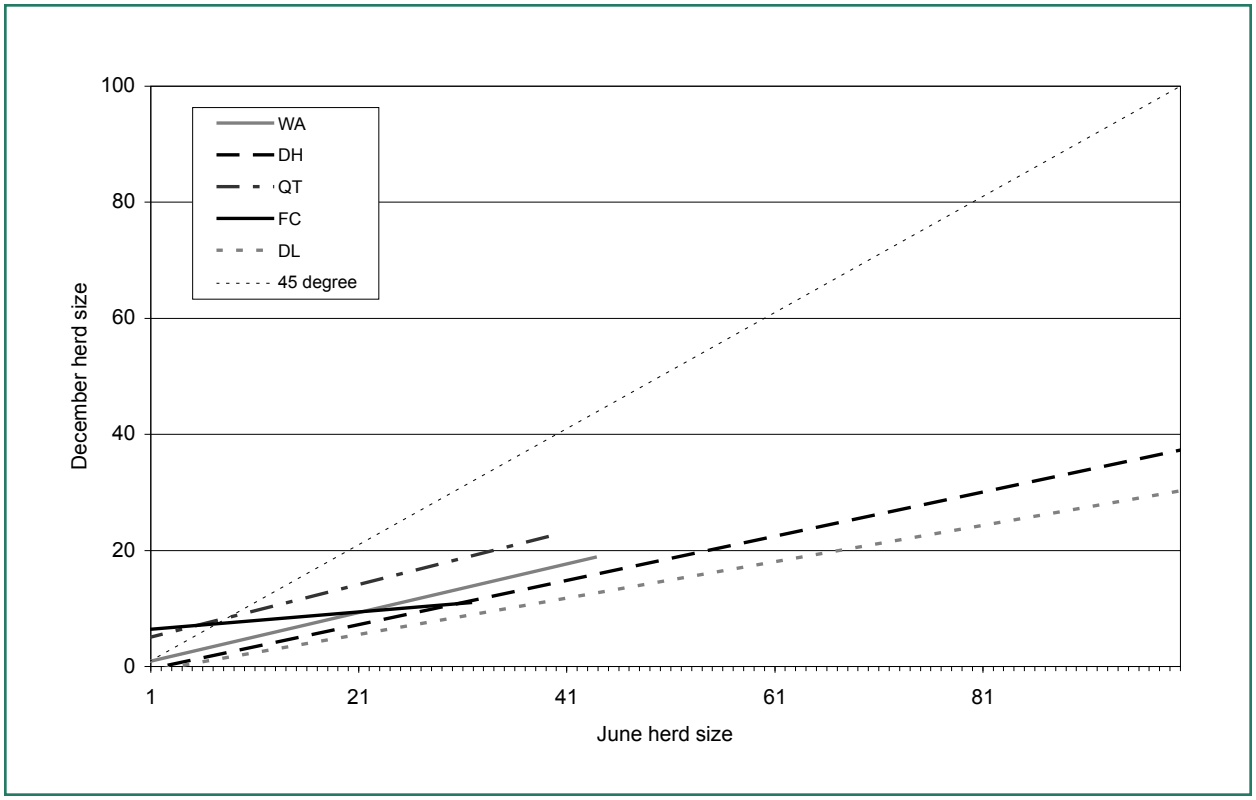
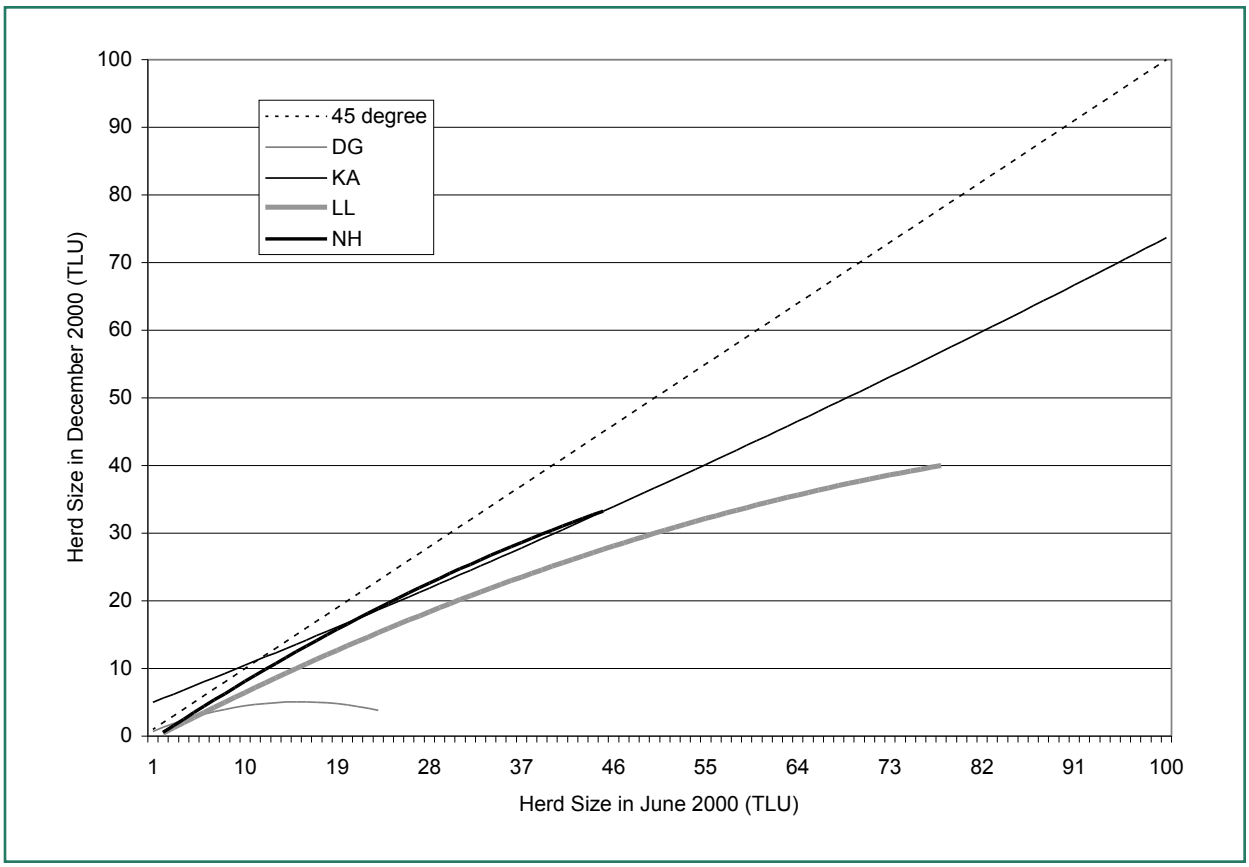


Figure 2. Simulation of regression results for herd size post crisis as a function of herd size pre crisis in Kenya.



North Horr (t=4.50). The other two Kenya sites of Sugata Marmar and Ngambo do not show significant differences in herd size using a paired t-test during this period.

[2]The Ethiopian sites showed major herd loss in June 1999. The paired t-test analysis indicates mean herd size declined significantly in Didahara (t=2.492), Dillo (t=4.36), Finchawa (t=3.55) Qorate (t=2.55), and Wachille (t=11.31).

[3]The axes of figures one and two are measured in TLU terms, and the site specific results are illustrated over the range of the data recorded in the sample. The horizontal axis measures herd size pre-crisis, and the vertical axis represents the expected herd size post-crisis for a given pre-crisis herd size based on the regression results for each site. A 45 degree line is added to provide a standard of comparison for when herd size pre-crisis is equal to herd size post crisis, so that the distance of the simulation line to the 45 degree line illustrates the size of the loss in TLU terms for a given pre-crisis herd size for each site.

[4]Dirib Gumbo experienced an average 71% loss over this period, and the R^2 for the regression =0.21. Kargi experienced an average 21% loss over this period, and the R^2 for the regression =0.95. Logologo experienced an average 38% loss over this period, and the R^2 for the regression =0.80. North Horr experienced an average 22% loss over this period, and the R^2 for the regression =0.80.

[5]Dillo experienced an average loss of 74% over this period, and the R^2 for the regression =0.86. Qorate experienced the lowest herd loss with an average of 34%, and the R^2 for the regression =0.39. Didahara experienced an average 77% loss over this period, and the R^2 for the regression =0.46. Wachile experienced an average 59% loss over this period, and the R^2 for the regression =0.64. Finchawa experienced an average loss of 50%, and the R^2 for the regression= 0.08.

[6]We would suggest that mobility was limited in Dirib Gumbo due to the location of the site on the shoulder of Marsabit Mountain and the tensions between the Boran community of Dirib Gumbo and the surrounding communities during this period.

[7]Evidence presented in Lybbert et al. (forthcoming) and McPeak (forthcoming) using data gathered in this study area suggests that aggregate herd size alone does not significantly influence change in household herd size.

Further Reading

Desta, S., and D.L. Coppock (2002). Cattle population dynamics in the southern Ethiopian rangelands 1980-1997. Journal of Range Management 55: 439-451

Doran, M., A. Low, and R. Kemp (1979). "Cattle as a Store of Wealth in Swaziland: Implications for Livestock Development and Overgrazing in East and Southern Africa." American Journal of Agricultural Economics. 61: 41-47.

Herskovits, M. (1926). "The Cattle Complex in East Africa." American Anthropologist. 28: 230-272; 361-388; 424-528; 630-644.

Jarvis, L. (1980). "Cattle as a Store of Wealth: Comment." American Journal of Agricultural Economics 62:3. p. 606-13

Lybbert, T.J., C.B. Barrett, S. Desta, and D.L. Coppock. (forthcoming) Pastoral risk and wealth-differentiated mortality, marketing and herd accumulation patterns in Southern Ethiopia. Economic Journal

McPeak, J. (forthcoming) Individual and Collective Rationality in Pastoral Production: Evidence from northern Kenya. Human Ecology.

McPeak, J. (2003). Contrasting Income Shocks with Asset Shocks: livestock sales in northern Kenya. Oxford Economic Papers. 56: 263-284

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The GL-CRSP Pastoral Risk Management Project (PARIMA) was established in 1997 and conducts research, training, and outreach in an effort to improve welfare of pastoral and agro-pastoral peoples with a focus on northern Kenya and southern Ethiopia. The project is led by Dr. D. Layne Coppock, Utah State University, Email contact: lcoppock@cc.usu.edu.

The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East Africa, Central Asia and Latin America.

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