



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**Traits Affecting Household Livestock Marketing
Decisions in Rural Kenya**

Katherine L. Baldwin
Department of Agricultural Economics
Purdue University

Vanessa DeVeau
Department of Agricultural Economics
Purdue University

Ken Foster
Department of Agricultural Economics
Purdue University

Maria Marshall
Department of Agricultural Economics
Purdue University

May 2008

*Selected Paper prepared for presentation at the American Agricultural Economics Association
Annual Meeting, Orlando, FL, July 27-29, 2008*

Copyright 2008 by Katherine Baldwin, Vanessa DeVeau, Ken Foster, and Maria Marshall. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Abstract

While many contemporary development programs with regard to Sub-Saharan Africa's pastoralists promote improved livestock marketing as a way out of poverty, they also fail to take into account the multi-functionality of livestock within these communities, and thus are doomed to failure. While livestock are a main source of income for the pastoralist household, they also serve a purpose as a store of wealth, food source, and status symbol. Furthermore, cattle and smallstock (sheep and goats) fulfill each function to a different degree. Since livestock are so multi-functional, marketing projects could better achieve their objectives if they had a more accurate picture of what motivates household livestock sale decisions.

To get a better understanding of why livestock are sold in one community of Central Kenya, we regressed household offtake rate of both cattle and smallstock against certain household characteristics, including number of household members, number of children, education, and employment. Additionally, we used a logit model to determine if those same characteristics affect the overall decision to sell instead of just the offtake rate. We found that employment or self-employment of at least one household member significantly affected both offtake rate and sale decision. In addition, the number of household members and number of children in school had varying affects on cattle and smallstock offtake rates. The results regarding smallstock suggest that they are considered a more liquid asset, so perhaps future programs should target increasing the profitability of smallstock production as opposed to cattle production. Overall, our analysis shows that community livestock sales are motivated by factors other than price, and as such should be considered in the design of any future marketing programs.

Introduction

Economists have proposed a myriad of schemes to eradicate pastoralist poverty in Kenya. Because pastoralist economies depend almost exclusively upon livestock production, most recent projects have focused on how to help pastoralists increase cattle offtake or take advantage of higher prices and thus increase producer surplus. While some approaches have shown progress in specific areas, each community has its own needs and idiosyncrasies that cannot be overlooked when designing marketing programs.

These development strategies are further complicated when the secondary goal of wildlife conservation is added to necessary project outputs. Achieving both an increase in income for local people and a decrease in cattle numbers requires an increase in offtake rates, but raising prices may not entice pastoralists to sell in all cases. First, a detailed study of the community must be undertaken in order to understand the marketing motivations of households, giving some insight into the reasons why producers keep and market livestock. Second, one must recognize that accurate price information is typically lacking in places like rural Kenya, and even if it is available the mechanisms by which animals are moved to markets and the structure/conduct of markets may limit the importance of price in marketing decisions. Rather, household characteristics may be more important motivating factors behind livestock sales.

Pastoralist policy decision-making has entered a new era of community-based solutions, but a failure to recognize why producers sell cattle in the first place may derail marketing projects before they get off the ground. By identifying the characteristics of pastoralist households that market both cattle and smallstock¹, more viable long-term development projects

¹ We use the term “smallstock” to represent livestock such as sheep and goats. Past literature has commonly used, as an etymological hybrid, the word “shoat” to refer to this class of livestock. We feel that is important to note that the word shoat has a very specific definitional meaning that is quite different than what is intended. Properly defined, a shoat is a young pig; a category of livestock that one is unlikely to encounter in rural Kenya.

may be feasible that provide increased benefits to producers, wildlife, and the broader pastoral community economies.

Review of the Literature

While Fratkin (1997) describes three categories of pastoralist literature, the bulk of development schemes have been motivated by the ecological body of work. Though many ecological studies, such as that of Dahl and Hjorst (1976), focused on the economics of herding and pastoralist production, the dominant vein beginning in the late 1960's followed Hardin's "Tragedy of the Commons" thesis – because pastoralist land was held communally, the system was subject to abuse by individuals who do not internalize the social cost. This free rider mentality leads to a decline in the resource base and a subsequent loss of productivity for the whole community.² Instead of being seen as adaptable innovators living off of marginal lands, pastoralists were blamed for desertification and wildlife population decline.

Many national policies and donor strategies were designed around Hardin's theories. Development experts viewed the economic viability of pastoralism as insufficient to sustain Sub-Saharan Africa's growing population, and thus advocated land privatization and a comprehensive shift to more western-style production. The shift included projects such as the construction of boreholes, livestock marketing schemes, and disease eradication programs, with the common end goal of pastoralists marketing healthier cattle for profit and decreasing their need to keep large herds. Unfortunately, programs like these upset the ecological order of pastoralist production and ignored the multi-functionality of livestock within these communities. To pastoralists,

² This story requires either that the individual is ignorant of the decisions being made by others and the joint consequences or heavily discounts their own future well-being in favor of the present. Due to the high degree of uncertainty about the future and the lack of functioning financial institutions it is highly likely that Kenyan pastoralists might fall prey to the latter.

livestock are food source, bank account, status object, source of income, and an essential thread in the fabric of community relations. Anthropologists argued that ignoring these additional uses would cause project failure, and they were correct. Likewise, to the extent that the projects improved survival rates of livestock and access to markets, they also increased the economic incentives to produce cattle and may have actually worked counter to their intent.

The mid-1990's saw a reversal in the ecological thesis of Hardin that led to an array of new development policy options. The work of Behnke and Scoones (1992), among others, at the beginning of the decade showed the climates inhabited by pastoralists to be so inherently unstable that these changes, not overstocking, were at fault for the cited land degradation. Traditional pastoralist land management was also found to be more efficient and sustainable than any implemented western-based alternatives. Given these developments, policy advocates have shifted their focus to community-based initiatives, banking advocacy, alternative enterprises, and information distribution regarding both livestock prices and drought early-warning systems. New marketing programs are offering both sale opportunities and alternative forms of saving, taking into account the total value of an animal's functions, not just its commercial potential.

While these new approaches seem more promising than the misguided development schemes of the past, not all schemes are suitable for individual communities. The idiosyncrasies of each community regarding their access to infrastructure, forage availability, and willingness to adopt new technologies and production methods is tantamount to increasing pastoralist productivity, incomes, and standard of living. Additionally, successful approaches must account and compensate for all functions of livestock. The people of the Il Ngwesi community of Central Kenyan have presently arrived at this crossroad of selecting their future economic development strategy.

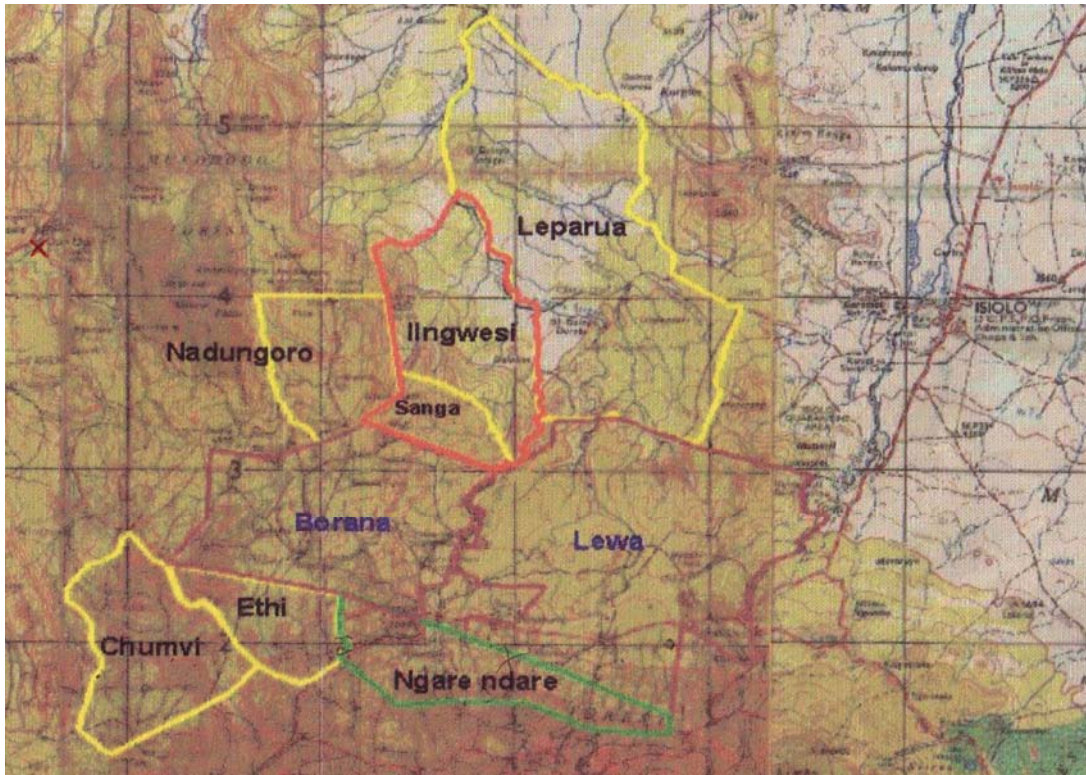
Il Ngwesi, Laikipia District, Kenya

Geographically, the pastoralist community of Il Ngwesi lies to the northeast of Mt. Kenya in the central part of the country. The community's land abuts Lewa Wildlife Conservancy to the South and East, Borana Ranch to the South and West, and open rangeland to the north inhabited by a mixture of Somalis and Samburu. The community members identify themselves as Laikipia Maasai.

Because of the group ranch's shared borders with two wildlife conservancies, the owner of Lewa approached community elders in the late 1980's and asked them to consider wildlife conservation as an alternative to the pastoralist ranching lifestyle. The owners of Lewa helped nudge Il Ngwesi toward embracing conservation by building schools, paying for school fees, sponsoring self-help groups, and allowing community livestock to graze on Lewa in a controlled manner. With the cooperation of Lewa, Il Ngwesi community discussions ensued, and in 1995 members finally agreed to set aside a large tract of communal land designated exclusively for conservation.

A tourist resort was built in this area, and community members residing there were forced to move to lands to the south and east. These new settlement areas are referred to as "neighborhoods" by community members. The neighborhoods differ in annual rainfall, elevation, infrastructure, and land tenure – in some areas, group ranch members hold private land titles while land is divided up communally in others. The residents of the private tenure neighborhoods of Chumvi, Ethi, and Ngare Ndare display more wealth than their counterparts in the communal neighborhoods of Leparua, Nadungoro, and Sanga. All of these neighborhoods and their orientations with respect to Lewa can be seen in Figure 1 below.

Figure 1



Because of its communality and proximity to the original group ranch (now conservation area), Leparua is considered the baseline against which all other neighborhoods are compared. Other characteristics of Leparua include low elevation, low rainfall, and relative proximity to the town of Isiolo, as well as a common border with Lewa. Sanga has a climate similar to that of Leparua, but its higher elevation eliminates the possibility of cultivation. Additionally, its isolation from Lewa and any population centers make commerce difficult. Nadungoro is on the community's western edge, bordering Sanga and the Borana Ranch. The neighborhood has many forested areas and receives moderate rainfall. It is also the closest neighborhood to the bi-weekly livestock market and bazaar held at Dol Dol.

Ngare Ndare borders Lewa and Borana Ranch on the south. It has the advantage of running the length of a non-seasonal river, making intensive irrigation and the small-scale

cultivation of high-value crops like spring onions possible. Chumvi and Ethi lie to the south and west of Ngare Ndare. Both are close to the town of Timau and the A2 highway, so commerce is much easier than in the rest of the community. Moderate rainfall, an elevation conducive to wheat and corn cultivation, and private land tenure combine to make the area ideal for small-holder farming.

Like more than a dozen other communities in the arid northern portion of Kenya, Il Ngwesi group ranch is a member of the Northern Rangelands Trust (NRT), an NGO that attempts to facilitate economic development in these pastoralist communities who pledge to dedicate a portion of their land to conservation. This is done through community planning and dialogue, business advisement, microfinance opportunities, marketing of tourist facilities, and the securing of international donors.

Linking Livestock Markets to Wildlife Conservation

Because Il Ngwesi has been under the umbrella of NRT since its inception, the organization selected the community for its “Linking Livestock Markets to Wildlife Conservation” pilot project. The project’s goal is to increase livestock sale offtakes by increasing revenue per animal. NRT’s perspective is that this will encourage producers to keep fewer livestock as a buffer against price shocks and thus leave community members free to dedicate more land to wildlife conservation. Toward this end, they have implemented a buy and fatten program where strictly community cattle are purchased for a set price per kilo, thus reducing cattle sale uncertainty in the form of weight lost on the trek to market, potential buyer collusion, or the possibility of not selling.

But programs like these tend to discount the fact that livestock in pastoralist communities serve several purposes and pure enterprise income generation may not be the most important of those. Earlier we alluded that price information may be of limited importance in this environment because even if it were available, livestock are often trekked overland for days to market, and markets meet only infrequently and suffer from asymmetries in market power between buyers and sellers so that any price expectations are likely to be highly inaccurate. Furthermore, livestock in the Kenyan pastoralist setting are held as a store of wealth in the absence of any reliable and efficient financial institutions or capital markets. Additionally, milk and milk products comprise a significant portion of daily caloric intake, such that marketing of female cattle is uncommon for all but the largest stock holders.

As livestock are such a multi-faceted household asset, it follows that households should only be willing to part with them when more pressing needs arise. By analyzing household marketing decisions with respect to household characteristics, we hope to shed light on the factors that motivate households to sell animals. If other household characteristics are found to correlate highly to the the household offtake rate and the overall decision to sell or not sell, then these factors should be taken into consideration in the formulation of destocking programs such as that proposed by NRT.

Given the emphasis placed on the multi-functionality of livestock in the literature, the implication is that households will treat livestock similarly to a savings account or stock portfolio and typically (and perhaps reluctantly) only sell livestock to cover cash shortfalls when certain necessary expenditures arise. Depending upon the household liquidity of livestock, animal sales may take place frequently to cover living expenditures or infrequently to cover lumpy expenses such as school fees, tuitions, and uniforms. Additionally, pastoralist households likely hold

livestock as a buffer against future uncertainties and obligations that cannot be completely foreseen.

To the extent that the household has other sources or potential sources of income, such motivation may be reduced. That is, if a member(s) of the household has other employment or education that provides them with the means to meet future unexpected obligations then, at the margin, their propensity to sell livestock in the short run should be lower, *ceteris paribus*. Alternatively, those household heads with education may have improved bargaining skills and/or better access to markets and thus be able to receive higher prices; reducing the number of animals they must sell to meet various obligations.

It is important to emphasize the difference between holding wealth in the form of livestock versus savings and stock accounts. Livestock holdings can only be liquidated in lumpy discreet units whereas, by comparison, a savings account is almost infinitely divisible. This characteristic makes livestock a rather illiquid asset and may have implications both for marketing decisions and explain some of the shift toward small stock that allow the holder to liquidate a smaller portion of their total asset base to cover the various cash expenses discussed above.

Methodology

Data Collection

The data for this study was collected in and around Il Ngwesi under NRT's "Linking Livestock Markets to Wildlife Conservation" pilot study. A multipart survey, including sections on household demographics, livestock holdings and marketing decisions, wildlife damage, income diversification, and attitudes toward tourism and wildlife conservation, was conducted in

all neighborhoods of the community from August through December of 2007. This was done with the help of three enumerator/translators from the community. Households were selected at random, and the sample includes approximately 35% of the community's entire population. In all, 218 households were surveyed, and their survey answers and demographic information forms the basis for this analysis.

Data Analysis

Much of the literature analyzed asserts that cattle, sheep, and goats fulfill many other household functions aside from being a source of income. Some of these alternate uses include food source, store of wealth, and symbol of status within the community. Even though each type of animal can serve each of these purposes³, the extent to which each household depends upon cattle versus smallstock for each function will vary. In addition, the differences in liquidity of the two types of animals may lead to different sale motivations and marketing patterns. For this reason, separate regressions were analyzed for cattle and smallstock rather than pooling them under the guise of total livestock units. For both cattle and smallstock, our focus was concentrated upon the factors that affected offtake rate, as well as the overall decision to sell or not sell animals.

Regressions 1 & 2: Cattle and Smallstock Offtake Rates

To gain some insight into household livestock sale motivations, several household characteristics were regressed against offtake rate (calculated by dividing the number of animals sold in 2006 by the current herd size). Offtake rate was used as opposed to the “number of cattle sold” because the number of animals sold was highly dependent upon the initial herd size. The calculation was done in order to normalize the sales of different-sized cattle enterprises for a

³ Smallstock typically do not offer the same level of status that cattle confer to the owner.

more useful comparison, as there is a substantial income gap (and herd size gap) within the community.

For cattle offtake rate, the model is expressed as:

$$(1) \quad COR = \beta_0 + \beta_1 SANGA + \beta_2 NADUNGORO + \beta_3 CHUMVI + \beta_4 ETHI + \beta_5 NGARENDARE + \beta_6 OTHER + \beta_7 PEOPLE + \beta_8 SCHOOL + \beta_9 SECOND + \beta_{10} EDUCATION + \beta_{11} VOCATION + \beta_{12} WAGE + \beta_{13} SELF$$

where *COR* represents the cattle offtake rate, calculated according to the explanation given above. *SANGA*, *NADUNGORO*, *CHUMVI*, *ETHI*, *NGARENDARE*, and *OTHER* are all dummy variables for the neighborhood in which each household is located (Leparua is therefore included in the intercept). The next set of variables are included to determine whether or not livestock are used to fund ongoing or lumpy household expenses – paying for household living expenses being continuous and school fees being lumpy in this case. *PEOPLE* represents the number of household members, *SCHOOL* represents the number of household members currently attending any form of school, and *SECOND* signifies the number of household members currently attending secondary school or higher.

The last set of variables was included to determine whether or not a household's income-earning potential induced them to sell more animals at the margin. This was done both on the basis of current employment or self-employment, as well as the potential to find employment vis-à-vis the level of household head education. *EDUCATION* is a continuous variable expressing the number of years of schooling attained by the household head, *VOCATION* is a binary variable where 1 signifies that the household head has had some additional vocational training and 0 means they have not, and *WAGE* and *SELF* are binary variables capturing whether or not any member of the household has wage employment or self-employment, with a 1 signifying employment and a 0 meaning there is none. The most common forms of wage

employment seen in the community are working for a local tourism operation and participation in the national police/military. The most common forms of self-employment were foodstuff sales, crop-raising, and livestock buying.

It should be noted here that animal sale price, a variable that should be highly relevant to this model, has been excluded. This is due to a deficiency in the data. While interviewees could remember how many animals had been sold the previous year, many were unable to recall the price or expected price for which the animals were sold. Including price in the regression reduced the sample size from 206 to 69. A test regression was run with the sample of 69 using sale price in addition to the other variables described above, and sale price was not statistically significant. Based on this finding and in the interest of including more households in the sample, sale price was dropped from the regression.

The regression for smallstock offtake rate is similar to (1), with the only change being the dependent variable, smallstock offtake rate, or *SOR*, as seen below:

$$(2) \quad SOR = \beta_0 + \beta_1 SANGA + \beta_2 NADUNGORO + \beta_3 CHUMVI + \beta_4 ETHI + \beta_5 NGARENDARE \\ + \beta_6 OTHER + \beta_7 PEOPLE + \beta_8 SCHOOL + \beta_9 SECOND + \beta_{10} EDUCATION \\ + \beta_{11} VOCATION + \beta_{12} WAGE + \beta_{13} SELF$$

Regressions 3 & 4: Sale or No-Sale

While it seems that the offtake rate regressions above would be the most enlightening regarding the characteristics affecting household sale rate, a surprising percentage of households chose not to sell at all – almost 60% of households surveyed had not sold cattle in the previous year, and 34% had not sold any smallstock⁴, though 83% of households surveyed owned cattle and 91% owned smallstock. For this reason, we wanted to know what characteristics, if any,

⁴ It is worthwhile to note that the much greater percentage of households selling smallstock versus that for cattle supports our argument concerning the greater liquidity of smallstock and the resulting increased propensity to sell.

separate sale households from no-sale households. Because the dependent variable was a yes/no decision, logit regression was used for this estimation. The following model was used:

$$(3) \quad \begin{aligned} CSALE = & \beta_0 + \beta_1 SANGA + \beta_2 NADUNGORO + \beta_3 CHUMVI + \beta_4 ETHI \\ & + \beta_5 NGARENDARE + \beta_6 OTHER + \beta_7 PEOPLE + \beta_8 SCHOOL + \beta_9 SECOND \\ & + \beta_{10} EDUCATION + \beta_{11} VOCATION + \beta_{12} WAGE + \beta_{13} SELF \\ & + \beta_{14} CATTLE + \beta_{15} SMALLSTOCK \end{aligned}$$

where *CSALE* represents the binary decision to sell or not sell cattle. All other variables are the same as described above, with the addition of two variables, *CATTLE* and *SMALLSTOCK*, represent size of the cattle and smallstock herds, respectively.

The regression for whether or not a household sold smallstock was identical except for the dependent variable, *SMSALE*, as is shown below.

$$(4) \quad \begin{aligned} SMSALE = & \beta_0 + \beta_1 SANGA + \beta_2 NADUNGORO + \beta_3 CHUMVI + \beta_4 ETHI \\ & + \beta_5 NGARENDARE + \beta_6 OTHER + \beta_7 PEOPLE + \beta_8 SCHOOL + \beta_9 SECOND \\ & + \beta_{10} EDUCATION + \beta_{11} VOCATION + \beta_{12} WAGE + \beta_{13} SELF \\ & + \beta_{14} CATTLE + \beta_{15} SMALLSTOCK \end{aligned}$$

Results

Regression 1: Cattle offtake rate vs. household characteristics

The estimation results for offtake rate regressed against the demographic variables described above can be found in Table 1.

--TABLE 1 HERE--

The most significant variables in the regression turn out to be the presence of wage or self-employment (significant at the 5% and 1% levels, respectively), but their signs are not both negative as hypothesized, as can be seen in Table 1. Rather, the regression shows that

households with self-employment have a 9% higher offtake rate on average. Perhaps this is because self-employed households must sell animals in order to finance their home-based businesses. It may also be the case that self-employment is more permanent than wage employment and provides a longer term buffer against future commitments, allowing greater cattle liquidation in the short run. Conversely, households with wage employment had cattle offtake rates 6% lower than average, suggesting that the wages from their employment could directly go to pay some expenses without necessitating the sale of cattle. The other demographic variable significant at the 5% level was the number of household members. As expected, households with more members had higher cattle offtake rates, probably to pay for the added expense of additional members.

The only location variable that was significant at the 10% level was that of Chumvi, and it signified that households from this area had lower than average offtake rates. This may be a consequence of the neighborhood's private land tenure system and the subsequent concentration in crop production as a way to pay for household expenditures.

While the regression is significant, the low R^2 of 0.13 suggests that there is much more to this story than is being told by the household variables we selected. The drought of 2006 might possibly have been this extraneous sale motivation, making any household expenses moot by comparison.

Regression 2: Smallstock offtake rate vs. household characteristics

The smallstock regression told a different story than the cattle regression, but again it was similar in its low R^2 value of 0.11. Again, the drought as an extraneous variable is a logical explanation for this low explanatory power as it would have affected all types of livestock.

As can be seen in Table 1, wage employment was the regression's most significant variable, and again it showed that households with wage employment have lower smallstock offtake rates than the average. Self-employment was not significant in the case of smallstock, underscoring the possible need for larger amounts of working capital to finance a business. As an illustration, the average cattle sale price of 15,000 Kenyan shillings per head is 10 times the average smallstock sale price of 1,500 Ksh per head.

The only significant household demographic in this case was not the size of the household, but instead the number of children in school. Smallstock offtake rate increases by 2% for each child in school. Since the number of children in secondary school is not significant, it is reasonable to conclude that the more liquid smallstock are used to pay for the small school necessities needed by children of all ages, such as uniforms and textbooks, rather than large annual school fees paid only by parents of secondary school students.

No location variables were significant at the 10% level.

Regression 3: Cattle Sale Decision vs. Household Characteristics

At the 10% significance level, the OLS regressions above and the logit regressions 3 and 4 share wage employment as a significant variable. Tables 2 and 3 reveal that the results from logit regressions 3 and 4 reinforce the relationship between livestock sales and household employment status established in regressions 1 and 2.

--TABLE 2 HERE--

Recall from above that households with wage employment had lower than average offtake rates. The same type of relationship holds in regression three. Households with wage employment marketed cattle 33% as often in 2006 as households without wage employment. Because wage-

employed households have a steady source of income, cattle do not need to be liquidated in order to pay for large expenditures.

While the number of cattle owned was not a significant indicator of whether or not a household would sell cattle, the number of smallstock owned was significant at the 5% level. Producers with large smallstock herds were shown to be slightly more likely to sell cattle than the average producer.

One location variable was significant in Regression 3 as well. Households in Nadungoro sold cattle only 38% as often as the average household. The reason for Nadungoro's low sales rate probably stems from its lack of available grazing land for cattle, as Nadungoro is a small, communally-held neighborhood that is isolated from other communal grazing sites by distance and rugged terrain.

Regression 4: Smallstock Sale Decision vs. Household Characteristics

Wage employment had an identical relationship with smallstock sale decision as that described above for cattle. Self-employment was also significant in this regression, as can be seen below in Table 3.

--TABLE 3 HERE--

Households with wage employment are less likely to sell smallstock than households without, but the interesting part about this result is the difference in magnitude between smallstock and cattle sale decision. While wage-employed households are less likely to sell either cattle or smallstock, they are more likely to sell smallstock than cattle when they do make a sales decision. This underscores the relative liquidity of the two types of livestock. Additionally, households with self-employment were 2.6 time more likely to sell smallstock than the average

household. Since no significant relationship was observed regarding cattle sales, this reinforces the idea that smallstock serve a financing role for households with home-based businesses.

Nadungoro was again an important location in this model as it was in 3. Nadungoro households are nearly 1/3 as likely to sell smallstock as residents of other neighborhoods. As for cattle, we attributed this to the communal nature of the land in the neighborhood (a lack of sufficient grazing). The number of smallstock owned is also a significant factor in determining sale decision. As intuition would suggest, people with larger sheep or goat herds were slightly more likely to sell. No other factors were significant at the 10% level.

Conclusions and Opportunities for Further Research

Taking into account the results from our models, we believe them to be in line with the literature cited above, as most sources recognize all the functions that livestock serve in this type of pastoralist community. In essence, they detail why households in communities like Il Ngwesi keep cattle – not why they sell them. The significance of the wage employment and self-employment variables in each regression suggests that both cattle and small stock are income-earning activities, but the animals also serve as a store of wealth when the household has other available sources of income and as a source of financing for the self-employed. Future regressions could explore the relationship between employment/self-employment type and the propensity to sell

A further result that is supported by summary statistics concerning the greater percentage of households that sold smallstock versus those who sold cattle and the regression results where smallstock were more likely to be sold for school expenses demonstrates the liquidity benefits of smallstock. This is important because smallstock may also be more sustainable from an

environmental standpoint and future development efforts aimed at balancing land use between cattle and wildlife should focus on enhancing the relative profitability of smallstock holding rather than on increasing offtake rates of cattle. Overall, we believe that our results show that factors other than sale price affect the decision to sell, and that these factors should be taken into account in the development of marketing projects for Il Ngwesi as well as other pastoralist communities throughout Sub-Saharan Africa.

References

- Bailey, D., C.B. Barrett, P.D. Little, F. Chabari. 1999. "Livestock Markets and Risk Management Among East African Pastoralists: A Review and Research Agenda," GL-CRSP Pastoral Risk Management Project Technical Report 03/99.
- Behnke, R.H, and Scoones, I. 1992. "Rethinking Range Ecology: Implications for Rangeland Management in Africa." Environmental Working Paper No. 53, World Bank.
- Bekure, S. , P.N. de Leeuw, B.E. Grandin, P.J.H. Neate (eds). 1991. "Maasai Herding: An Analysis of the Livestock Production System of Maasai Pastoralists in Eastern Kajiado District, Kenya." *ILCA (International Livestock Center for Africa) Systems Study* 4:1-172.
- Coppock, D.L. 1994. "The Borana Plateau of Southern Ethiopia: Synthesis of Pastoral Research, Development and Change." *ILCA Systems Study* 5.
- Dahl, G. and Hjort, A. 1976. *Having Herds: Pastoral Herd Growth and Household Economy*. Stockholm: Department of Social Anthropology University of Stockholm.
- Dercon, S. 1998. "Wealth, Risk and Activity Choice: Cattle in Western Tanzania." *Journal of Development Economics* 55(1):1-42.
- Ellis, J. & Swift, M. 1998. "Stability of African Pastoral Ecosystems: Alternate Paradigms and Implications for Development." *Journal of Rangeland Management* 17(6):450-59.
- Fafchamps, M. 1998. "The Tragedy of the Commons, Livestock Cycles, and Sustainability." *Journal of African Economies* 7(3):384-423.
- Fafchamps, M. and Gavian, S. 1997. "The Determinants of Livestock Prices in Niger." *Journal of African Economies*, 6(2):255-295.
- Fafchamps, M., C. Udry, and K. Czukas. 1998. "Drought and Saving in West Africa: Are Livestock a Buffer Stock?" *Journal of Development Economics* 55(2):273-305.

- Fratkin, E. 1997. "Pastoralism: Governance and Development Issues." *Annual Review of Anthropology* 26:235-62.
- Fratkin, E. 1998. *Ariial Pastoralists of Kenya: Surviving Drought and Development in Africa's Arid Lands*. Boston: Allyn and Bacon.
- Fratkin, E. 2001. "East African Pastoralism in Transition: Maasai, Boran, and Rendille Cases." *African Studies Review* 44(3): 1-25.
- Grandin, B.E. 1987. "Pastoral Culture and Range Management: Lessons from Maasailand," ILCA Bulletin, ILCA, Addis Ababa, Ethiopia.
- Hardin, G. 1968. "The Tragedy of the Commons." *Science* 162:1243-48.
- Homewood, K. 1995. "Development, Demarcation and Ecological Outcomes in Maasailand." *Africa: Journal of the International African Institute* 65(3): 331-350.
- Kristjanson, P., M. Radeny, D. Nkedianye, R. Kruska, R. Reid, H. Gichohi, F. Atieno, R. Sanford. 2002. "Valuing Alternative Land-Use Options in the Kitengela Wildlife Dispersal Area of Kenya," ILRI Impact Assessment Series 10, ILRI, Nairobi.
- de Laat, J.J. 1998. "Evaluation of the 1996 Emergency Livestock Off-Take In Merti- and Sericho Division, Isiolo District and Analysis of the 1998 Livestock Marketing Situation in Merti- and Sericho Division." Thomas J. Watson Foundation DPIRP, Nanyuki, Kenya.
- Lesorogol, C.K. 2003. "Transforming Institutions among Pastoralists: Inequality and Land Privatization." *American Anthropologist* 105(3):531-42.
- McPeak, J., Little, P. 2006. *Pastoral Livestock Marketing in Eastern Africa: Research and Policy Challenges*. Warwickshire: Intermediate Technology.

Morton, J. 2002. "Community Based Drought Management for the Pastoral Livestock Sector in Sub-Saharan Africa," ALive Policy Options Paper.

Sandford, S. 1983. *Management of Pastoral Development in the Third World*. Chichester: Wiley.

Table 1. Regression Results

Variable	Model 1	Model 2
	Cattle Offtake	Smallstock Offtake
Intercept	0.051 (1.15)	0.108 (2.55)
SANGA	-0.123 (-1.42)	0.029 (0.32)
NADUNGORO	-0.049 (-1.28)	-0.043 (-1.21)
CHUMVI	-0.065* (-1.88)	0.018 (0.54)
ETHI	-0.008 (-0.16)	0.072 (1.49)
NGARENDARE	-0.031 (-0.73)	0.018 (0.45)
OTHER	0.068 (0.81)	0.032 (0.41)
PEOPLE	0.017** (2.18)	-0.002 (-0.21)
SCHOOL	-0.007 (-0.60)	0.020* (1.83)
SECOND	0.011 (0.56)	0.014 (0.75)
EDUCATION	0.001 (0.29)	-0.003 (-0.87)
VOCATION	-0.011 (-0.68)	0.013 (0.90)
WAGE	-0.061** (-2.34)	-0.075*** (-3.04)
SELF	0.093*** (2.66)	0.015 (0.47)
R ²	0.13	0.11
N	208	207

***, **, * represent significant at the 1%, 5%, and 10% levels, respectively

Table 2. Model 3 Cattle Sale/No Sale Logit Regression Results

Variable	Estimate	Std. Error	Odds Ratio
SANGA	-0.262	1.019	0.769
NADUNGORO*	-0.961	0.560	0.383
CHUMVI	-0.722	0.583	0.486
ETHI	0.583	0.695	1.791
NGARENDARE	0.142	0.555	1.152
OTHER	0.973	1.060	2.647
PEOPLE	0.109	0.103	1.115
SCHOOL	-0.100	0.161	0.905
SECOND	0.368	0.283	1.445
EDUCATION	0.003	0.051	1.003
VOCATION	-0.263	0.161	0.769
WAGE***	-1.120	0.362	0.325
SELF	0.720	0.464	2.054
CATTLE	0.016	0.110	1.017
SMALLSTOCK**	0.007	0.003	1.007
		Chi-Square	Pr>ChiSq
		58.040	0.00001
Frequency		Did Not Sell	Sold
		123.000	83

***, **, * represent significance at the 1%, 5%, and 10% levels respectively

Table 3. Model 4 Smallstock Sale/No Sale Logit Regression Results

Variable	Estimate	Std. Error	Odds Ratio
SANGA	0.901	1.274	2.462
NADUNGORO**	-1.317	0.530	0.268
CHUMVI	-0.536	0.459	0.948
ETHI	0.654	0.775	0.192
NGARENDARE	0.571	0.606	0.177
OTHER	-0.120	1.070	0.887
PEOPLE	-0.100	0.107	0.905
SCHOOL	0.209	0.160	1.232
SECOND	-0.193	0.295	0.824
EDUCATION	0.041	0.058	1.042
VOCATION	-0.056	0.351	0.945
WAGE**	-0.822	0.366	0.440
SELF*	0.953	0.514	2.594
CATTLE	-0.006	0.010	0.994
SMALLSTOCK***	0.011	0.004	1.011
		Chi-Square	Pr>ChiSq
		50.510	0.00001
Frequency		Did Not Sell	Sold
		70.000	135

***, **, * represent significance at the 1%, 5%, and 10% levels respectively