EXPLAINING HETEROGENEOUS OUTCOMES OF A PRODUCTIVE ASSET TRANSFER: A GOAT PROGRAM IN HAITI

by

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(Under the direction of Nicholas Magnan)

ABSTRACT

Livestock transfer programs, have become an essential component of many NGOs' strategies for reducing poverty among smallholders and subsistence farmers in less developed countries. Despite their prevalence, however, the effectiveness of this class of productive asset intervention remains relatively unstudied. In this paper, we examine initial outcomes of an NGO-sponsored goat transfer-and-training program in rural Haiti.Before realizing the ultimate program goals of improved health, greater levels of education, better housing and more productive farms, beneficiaries must build sustainable herds of healthy goats. Therefore, we measure a set of outcomes related to herd health and growth and explaintheir variation across beneficiariesbyregressing them on a set of household variables. Specifically, we find compelling evidence that wealthiest beneficiaries build smaller, less valuable herds when compared to the poorer beneficiaries. In addition, we find that access to land significantly reduces kid mortality, a key to sustainable, profitable goat herding.

INDEX WORDS: Productive Assets, Goats, Haiti, Sustainability, Livestock Transfer, Poverty Traps.

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SECTION 1: INTRODUCTION

1.1 *Introduction*

This thesis developed from a program evaluation I carried out in the summer of 2013 on behalf of Global Health Action, an Atlanta, Georgia based NGO that sponsors public health and rural economic development programs in Haiti.

Global Health Action (GHA hereafter) has operated a goat transfer program in Haiti since the late 1980s. The program operates based on a model that is relatively common in developing countries around the world. Beneficiaries are provided with a pregnant doe goat- a native Creole goat that has been bred with an improved-variety male, normally a Boer goat. The resulting offspring are more disease resistant, grow to a bigger size more quickly than pure Creoles, and provide superior meat. Program staff believes the hybrid goats to be one and a half to twice the value of a typical Creole. In addition to the goat itself, beneficiaries attend a two day training seminar that imparts the basics of goat feeding, shelter, husbandry, grooming, and health care. Once in the program, participants receive free veterinary care- mainly deworming and vaccinations- for a year. They also have access to a zone leader in their area who acts as an extension agent and keeps an improved buck for subsequent breeding. GHA intends for beneficiaries to grow small, sustainable herds from which they can make occasional sales to pay for essentials like school fees, medicine, or nutritious food.

While long-time staff members and donors can cite numerous anecdotal instances of beneficiaries whose lives have been markedly improved by the goat program, no rigorous, quantitative study of outcomes has ever been conducted. This study aims to fill gaps in GHA's

knowledge of its own program, enabling them to provide a better, more efficient service, while at the same time answering larger questions having to do with asset dynamics. This thesis presents some results of the academic enquiry.

1.2 *Problem Statement*

One criticism of productive asset transfers in general, livestock transfers in particular, has been that they are sometimes treated as one-size-fit all rural economic development panaceas. The intuitive appeal of the teach-a-man to fish model, and the donor appeal of photos of children with baby goats, might cause an overzealous application of this kind of treatment.

Our goal here is to identify those beneficiaries of the GHA intervention who are best equipped become successful goat farmers and thereby reap the intended benefits of the program.

1.3 *Objectives*

The objective of this study is to explain heterogeneous herd growth among goat program beneficiaries in terms of their profile of relevant assets.

1.4 *Hypotheses*

The four crucial goat-related outcomes that we track here are heterogeneous across beneficiaries. Informed by Carter and Barrett's (2006)work on multiple dynamic welfare equilibria, we hypothesize that beneficiaries will accumulate goats at different rates depending on the composition of their initial bundle of assets, with assets understood very broadly to mean the entirety of their human, social, geographic, and physical capital. Specifically, we expect those beneficiaries with better access to land and those in more rural communities to grow bigger herds. Other factors are indeterminate: cash on hand, wealth index, and education, for instance.

1.5 *Methods*

First, we develop a theoretical model of a beneficiary household's utility function, constrained by its initial asset bundle, and use the model to identify those households that will maximize their income from goat herds, as opposed to employing their asset bundle in some other endeavor with higher marginal returns.

With these predictions in place, we test our hypotheses with several different empirical specifications applied to data collected from GHA beneficiaries from 2010 to 2012.

1.6 *Organization of the Thesis*

This thesis is organized as follows. In Section 2 we discuss the related concepts of sustainability and asset-based interventions aimed at building productive capacity, especially livestock programs. In Section 3 we briefly review a few relevant threads of the sustainable development literature that inform our hypotheses and econometric model. In Section 4 we discuss the study location and provide an overview of the program. In Sections 5 and 6 we explain our data collection procedure, survey design, and methods. Section 7 contains our main results, and in Section 8 we conclude.

SECTION 2: THE SUSTAINABILITY DOCTRINE & LIVESTOCK INTERVENTIONS

2.1 *The Sustainability Doctrine*

The general trend in development aid has been away from ambitious, macro-oriented "big push" projects and towards smaller, more micro-oriented development projects, emphasizing local ownership and sustainability after donor support is withdrawn. These include locally driven public health projects, microfinance, and productive asset transfers like the goat program.

A growing literature examines the viability of these localized, sustainable development projects. Kremer and Miguel's (2007) work in this field examined a community based deworming program in Kenya that failed when donor support was withdrawn, concluding that it may be difficult for external interventions to promote sustainable local public good provision. Another frequently cited example is that of free insecticide treated bed nets (IBNs) for malaria prevention, which some believe are valued little by recipients and re-sold to non-poor households. However, recent experimental results seem to indicate that families value free IBNs more than previously thought(Hoffmann, et al., 2009). Similarly, Banerjee and Duflo (2008)examine the behavior of poor micro-entrepreneurs in less developed countries, and conclude that the median poor business owner does not attempt to grow their business, even taking into account the many constraints they face. These findings contradict the common presumption that aid recipients are eager to develop their productive assets, and only lack an opportunity.

While none of these interventions are perfectly analogous to the GHA goat program (the Kremer & Miguel(2007) paper, for instance, deals with positive public externalities, while the

benefits of goat ownership are clearly internalized), they all suggest that poor families in less developed countries respond to market failure and operate within constraints in unexpected ways that researchers do not fully understand yet.

2.2 *Livestock Interventions*

Productive asset transfers in general and livestock transfer programs in particular have become an essential component of many non-governmental organizations' (NGO) strategies for reducing poverty among smallholders and subsistence farmers in less developed countries. These programs are predicated on the well-established theory that keeping small ruminants can potentially improve livelihoods for poor farmers(Devendra and Chantalakhana, 2002, Lebbie, 2004, Peacock, 2005).

Productive asset transfers seem to have a mixed record in achieving their objectives. Livestock transfers specifically have resulted in different outcomes depending on the type of livestock and the context. A few examples follow.

A transfer program implemented by the Bangladeshi government and the UK Department for International Development in the chars of Bangladesh, one of the poorest places in the world, allowed families to invest in a range of different productive assets.[1] Of those who invested in cattle, about 19% had sold at least one cow in the 15 months after receiving it, most of the income was reinvested in cattle, and value of cattle herds had doubled over that time frame. Total household productive assets were also found to have increased substantially (Scott, et al., 2007). FARM-Africa dairy goat improvement projects in Kenya have also enjoyed great success. Outcomes include increasing the number of farmer groups from 10 to 160 in the project area over the period from 1996 to 2007. The number of purebred improved goats increased

[1]The Jumuna chars are low lying, sandy areas and flood prone islands in a fluvial zone in northern Bangladesh.

almost ten-fold, and new goat-herding groups were set up in other part of the country. Farmers participating in the project increased their income, and the values of their herds have significantly increased (J.M.K. Ojango, 2010). A recent paper looks at child nutrition and stunting outcomes among Heifer International beneficiaries in Rwanda. The subjects of the study had received either meat goats or dairy cattle. In all cases beneficiary households had increased meat consumption. In the case of meat-goat beneficiaries, the study found marginally statistically significant reductions in wasting and stunting; in the case of dairy cattle beneficiaries the study found reductions in stunting(Pimkina, et al., 2014). In addition, DeVries (2008) outlines some of the barriers to success and keys to sustainability that Heifer International has identified for goat improvement and transfer programs. Constraints faced by potential goat farmers include access to good breeding stock, access to veterinary services, and access to markets. Factors leading to success include organized self-help farmers' groups, improved access to credit, and training, education, and provision of extension service.

These studies, which are in some case less than rigorous, are representative of most of the existing evidence of the success of livestock transfers. However, an emerging literature seeks to rigorously identify positive outcomes of from these programs. Bandeira et.al (2013)conducted a randomized controlled trial to examine the effectiveness of the BRAC Bangladesh's "Targeting the Ultra-Poor" program, and found strong evidence that marginalized women who received a large infusion of livestock and skills training succeeded in moving from agricultural wage labor to small business ownership, with incomes increasing by 38%. Banerjee et.al(2011) conducted a similar RCT in West Bengal, India, of an intervention modeled on the BRAC program. Banerjee found outcomes similar to Bandeira, but also found evidence of improvement across a broader

range of outcomes, including household expenditures, asset holdings, women's empowerment, and psychological well-being.

Goat programs are ubiquitous in Haiti. In this paper, we examine one such program and present findings on how characteristics of program beneficiaries and their households affect their level of success in surpassing initial-threshold barriers to successful goat rearing: achieving successful kiddings and low kid mortality, building their herds in size and value, and making sales. Our approach differs from prior studies in its focus on preliminary rather than ultimate outcomes, and we know of no other quantitative studies of this kind of outcomes of a livestock transfer in Haiti. Given the sheer magnitude of development aid directed at Haiti and the runaway popularity of goat programs there, we feel that such a study is well overdue.[2]

[2]We know of no single, complete list of goat programs in Haiti and can only speculate at the magnitude of financial resources devoted to them. A quick Google search for "donate goat haiti" turns up dozens of results. We're attempting to develop a more formal census of goat projects for future versions of this paper.

SECTION 3: A CONCEPTUAL FRAMEWORK

3.1 *Asset Based Poverty, Asset Based Interventions*

A large and growing literature suggests that traditional, income based methods of measuring poverty are inadequate and do not capture the true nature of rural poverty in less developed countries, arguing that an asset based approach is more appropriate (Brandolini, et al., 2010). Carter and Barrett(2006) argue that lack of access to a minimum threshold bundle of productive assets can prevent households from participating in higher yielding income producing activities, leading to assets based poverty traps. Without a minimum level of assets, the argument goes, households will not be able to take advantage of opportunities, and interventions are unlikely to have a significant impact on income.Foster et al. (2011) build on this theory by suggesting that complementarities of productive assets matter more than absolute levels, and develop a framework for assessing such complementarities to help determine what combinations of assets should be promoted. Barrett (2005) makes a related argument, also distinguishing between structural poverty and stochastic poverty, and proposing that different sorts of asset based interventions should be applied to each group. Households living in structural poverty will not escape without some kind of outside intervention; these families should be targeted with "cargo net" programs (like the goat program) that enable them to build up their productive capacity. Households living in stochastic poverty might move out of poverty on their own, without intervention, and require only a "safety net" to prevent them from falling into persistent poverty.

This literature provides an interesting lens for looking at household assets, how the addition of a goat enhances these assets, and how recipients that lie on different sides of a productive asset threshold will make decisions. Based on the literature reviewed here, we generally expect the poorer beneficiaries in the sample to perform more poorly than the (relatively) wealthier beneficiaries.

3.2 *Theoretical Framework*

Here we consider the application of an intervention designed to build productive capacity within the context of the emerging theory of asset-based poverty dynamics.

Our theoretical model is inspired in large part by Carter and Barrett's(2006)work concerning multiple dynamic welfare equilibria and asset based poverty traps, so I will take the time to review the key points. According to Carter and Barrett, the income producing activities available to a household are a function of their initial bundle of assets. Further, there is some level of asset ownership that allows an impoverished person to subsist at a low level, structurally poor equilibrium; any level of assets in excess of that minimum level introduces the opportunity save, eventually enabling them to engage in higher return income producing activities, which ultimately results in arrival at a non-poor equilibrium. The goal of productive asset transfers is to deliver some level of assets (which may consist of physical, human, or social capital) such that the beneficiary's asset endowment is large enough to engage in those higher income producing activities. In our example, this is a transfer of goats and training intended to be sufficient to enable a beneficiary to engage in goat production when added to the beneficiary's initial asset bundle.

The levels of assets in the initial bundle matters, then, but so does the composition of the bundle. A beneficiary well endowed in human capital but lacking land, for example, may not

benefit from the addition of a goat and training to his productive asset base. Not all types of assets weigh equally with respect to a given production function, and we must consider complementarities as Foster suggests.

To begin with, we define an individual's asset endowment very broadly as the entirety of that person's physical, human, social, and geographic capital. The income producing activities available to an agent are determined by asset endowment, and the agent maximizes utility by choosing the optimal combination of income producing activities. How an individual responds to a transfer of goats and training depends largely on their existing portfolio of productive assets.

Looking at extreme cases, for example, we can easily see that some individuals might produce no goats at all, while others might produce goats to the exclusion of all other activities. If a beneficiary were endowed with no land, she would not be able to produce any goats and would focus strictly on some other activity.She would sell her goats to finance other enterprises, or they would die. On the other hand, if a beneficiary lacks the assets (say the human or physical capital required to be a teacher or driver) required to participate in any alternative activity (teaching or driving are examples from our study), but has been endowed with at least one goat and sufficient training and land to raise herd, she will devote all her productive assets to goat production. Conversely, the teacher or driver may get a higher return from their last unit of teaching and driving effort than they do from their first unit of goat-raising effort, and therefore fail to grow sustainable herds.

Based on this model, we can make a few predictions as to how beneficiaries will behave with respect to their herds. People with abundant geographic capital, which is to say those individuals who enjoy environmental circumstances that are conducive to raising goats, will generate more utility from goat rearing and grow larger herds. Similarly, those with access to more land will be

able generate higher profits from goatsand will therefore have larger herds. Wealthier individuals may have become wealthier in the first place because they have access to alternate productive activities, and therefore shift fewer units of effort and capital out of their primary activity and into goats and therefore show slower herd growth than someone less well-off who does not have other opportunities.

In our empirical model, we will test several elements of beneficiary's asset bundles in order to see which affect herd growth.

SECTION 4: SETTING & PROGRAM OVERVIEW

4.1 *Setting*

We conducted this research in the countryside inland from Léogâne, Haiti. Léogâne lies about 30km from Port-au-Prince along the main road serving the south and west of the country. Villages in the fielding area range from bustling, peri-urban towns along the highway to sparsely populated mountain villages accessible only by foot.

The epicenter of the January 2010 earthquake was located very close to Léogâne, and as a result this district suffered tremendous property damage and significant loss of life. Residents of the survey site make their living primarily from agriculture, with a significant fraction working as small-scale merchants and shopkeepers or providing some sort of service. They are almost uniformly poor.

4.2 *Program Overview*

Global Health Action (GHA) is a small NGO that has operated a goat transfer program in the countryside inland from Léogâne, Haiti since the late 1980s. The Global Health Action goat program works as follows:

A local staff composed entirely of Haitians purchase local (Creole) doe goats for cross breeding with an improved buck (usually a pure-bred Boer goat). In theory the resulting offspring are hardier, more disease resistant, and reach their weaning earlier and grow bigger

than native goats. According to the local staff, the 50% Boer offspring command a price anywhere from 150% to 200% of a Creole goat.[3]

Approximately once every four to six weeks, zone leaders recruit and select program beneficiaries, who come to the program headquarters for a two-day training seminar at GHA's "goat park" in Darbonne, Haiti.[4] Beneficiaries receive instruction in caprine husbandry, the basics of goat feeding and grooming, and the rudiments of veterinary care.

At the end of the training beneficiaries draw lots for the pregnant does. After returning to their villages, beneficiaries can access veterinary care (mainly deworming and vaccinations) though their zone leaders, who are trained animal health workers, or at GHA headquarters. In addition, zone leaders keep improved bucks so that beneficiaries can continue to build their herds by breeding their program does and female kids with improved stock.

GHA intends that beneficiaries build up their herds and periodically sell goats to pay school fees, buy nutritious food or medicine, or pay for other necessities. In addition, beneficiaries are expected to return one kid to GHA when they are able, which will in theory make the program more sustainable by reducing costs.

[3] GHA staff purchase the Creole females at local markets for approximately $60 USD. GHA staff estimate the value of the pure bred Boer buck used for most breedings to be approximately $1000 USD.
[4] Darbonne is a peri-urban area located close to Léogâne, on the edge of the program zone and on the main highway to Port-au-Prince.

SECTION 5: DATA

5.1 *Sample Selection*

We limited our sample to those beneficiaries who received a goat between the summer of 2010 and the end of 2011. Confining the sample to this window avoids noisiness caused by the catastrophic earthquake of January 2010, and ensures that beneficiaries have been in the program long enough for their does to kid and the kids to have weaned. Applying this constraint resulted in a list of approximately 400 beneficiaries spread across about a dozen distinct zones. Time and financial constraints precluded us from attempting to survey the entire population. Therefore, we selected seven zones representing a cross-section of the communities benefited by the goat program. Our final sample included a total of 169 beneficiaries.

GHA staff coordinated our visits with the zone leaders who facilitated interviews with beneficiaries, normally in their homes, but in the case of the most rural zones a central location.

5.2 *Survey Design*

We created a household/farm-level survey designed to capture data regarding each beneficiary's original program goat and all of its offspring, a set of household level variables, and a set of beneficiary level variables. Haitian college students fluent in Haitian Creole and French enumerated the survey.

SECTION 6: METHODS

6.1 *Outcomes Measured*

The cross-sectional nature of our data set and self-selection of beneficiaries into the program precluded us from measuring the ultimate intended outcomes. However, we can say with confidence that each beneficiary was not a goat owner prior to taking part in the GHA program.

Therefore, the goal of our study was to investigate barriers to success and sustainability of the goat program by measuring and attempting to explain the variability in several early indicators of success among program beneficiaries. Specifically, we looked at the kidding rates of donated does, kid mortality rates, total herd size, herd value, and whether or not the beneficiary had made a sale. We define these outcomes as follows:

Kidding Rate: A binary variable assigned to each beneficiary indicating whether her[5] original program doe kidded successfully. For the sample or any given sub-sample, we interpret kidding rate as the mean of the individual kidding observations.

Mortality Rate: We define kid mortality rate at the individual level as the percentage of kid goats from a beneficiary's program goat that died of sickness before reaching weaning age (two to three months). For the sample or any given sub-sample, mortality rate is the mean of the individual mortality rates in that group.

[5]For clarity and ease of composition, and because females outnumber males both in our sample and in the full population, we use feminine pronouns to refer to beneficiaries.

Herd Size: An objective measure of beneficiary success. Herd size is the total number of goats in a beneficiary's herd originating from their original program goat, including the program goat itself.

Herd Value: A subjective measure of beneficiary success. For each got in her herd, we engaged in a hypothetical bidding exercise wherein we increased an offer to purchase in 500 HTG[6] increments until the we arrived at a price the beneficiary would be willing to accept. We call this the personal valuation for each goat, and a beneficiary's herd value is the sum of each personal valuation.

Sale Made: A binary variable indicating whether or not a beneficiary has made a sale. We chose a binary variable instead of the most logical alternative- a limited dependent variable representing the quantity of goats sold by a beneficiary- because multiple sales occurred so infrequently in out sample. For the sample or any given sub-sample the sales rate is the mean of the variable, and is equivalent to the percentage of beneficiaries in the sub-sample who have made a sale.

In those specifications where mortality rate is the outcome variable of interest, we naturally limit our analysis to those beneficiaries whose donated doe kidded. Where herd size, herd value, or sale-made is the outcome of interest, we chose to limit our analysis to those beneficiaries.

6.2 *Explanatory Variables*

We collected explanatory variables falling into three distinct categories: zone level, household level, and beneficiary level.[7]

[6]Approximately $13 USD.
[7]Although we draw a distinction here between household level variables and variables that pertain strictly to the individual, it should be noted that household and individual level variables are the same econometrically.

Zone level variation is represented by a dummy variable indicating whether a beneficiary resides in a specific zone. Our regressions do not attempt to capture specific differences between the zones, but model differences between the zones as unobservable fixed effects.

Household level variables, on the other hand, are observable and mainly deal with relative wealth, access to land, and occupation. Relative wealth is modeled at the household level by a factor analytic wealth index derived from the quality of building materials of the beneficiary's home, primary source of drinking water, rooms-per-person, and a few other key variables (Table 6.1). After placing each beneficiary on a continuum based on wealth index, we divide the wealth index into quintiles to facilitate analysis. We also include a variable for the cohort in which a beneficiary entered the program, a crucial control for time-in-program that we expect to affect herd sizes and values. Also, because numerous individuals from the same household enter in the same cohort, controlling for cohort mitigates zone effects.

We consider cash-on-hand, access to credit, and total land (in hectares) separately from the wealth index. Cash on hand provides an alternative measure of wealth not based on the household's housing or other durable or productive assets, and therefore provides a second means for describing a wealth effect. This second means of describing wealth is fundamentally different from the first. Most of the components of the wealth index are neither liquid nor fungible, but given their small size and status as a commodity in Haitian markets, goats are.Beneficiary households cannot sell their concrete floors, for instance, in the event of a shock, but they can sell a goat. Therefore, we consider the fact that the availability of cash to a beneficiary will "protect" goats from premature, emergency sales and have a positive effect on herd size.

We include total land in our analysis, defined here as total owned or rented hectares at the beneficiary household's disposal, because we expect it to have a negative effect on mortality and positive effect on herd size and value.In addition, we control for whether or not a beneficiary defines their family as a farming or non-farming household.*Beneficiary level* variablescollected included age, gender, level of education

Table 6.1: Wealth Index Components, Percentage Ownership by Quintile

Factor	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Walls Painted	0.00	0.06	0.09	0.18	0.76
TLU[8]	1.30	0.45	0.77	0.57	0.14
Wood Walls	0.59	0.65	0.24	0.35	0.18
Block Walls	0.06	0.00	0.59	0.38	0.30
AS Walls[9]	0.00	0.00	0.03	0.18	0.52
Metal Roof	0.91	0.97	0.88	0.91	0.97
Block Roof	0.00	0.00	0.12	0.09	0.03
Tarp Roof	0.09	0.00	0.00	0.00	0.00
H_2O: Rain	0.00	0.00	0.00	0.03	0.00
H_2O: River	0.26	0.62	0.12	0.18	0.12
H_2O: Bottles	0.00	0.03	0.00	0.03	0.00
H_2O: Fountain	0.38	0.29	0.44	0.38	0.52
H_2O Public Well	0.32	0.00	0.44	0.24	0.27
H_2O: Private Well	0.00	0.00	0.00	0.03	0.03
H_2O: Pipes	0.03	0.06	0.00	0.12	0.06
Dirt Floor	0.97	1.00	0.09	0.00	0.00
Concrete Floor	0.00	0.00	0.82	1.00	1.00
Ceramic Floor	0.03	0.00	0.09	0.00	0.00
Rooms per Person	0.46	0.57	0.79	0.81	0.74

Source: Authors

6.3 *Village fixed effects, clustered standard errors*

We used a village fixed effects model with clustered standard errors. The clustering variable was the zone:

$$Y_{iz} = \propto + \boldsymbol{H}_i'\beta + \mu_z + \varepsilon_{iz}$$

[8]Tropical livestock units.
[9] Anti-seismic walls.

Where μ_z is an intercept shift from the zone dummy, $\mathbf{H_i}$ is a vector of household and beneficiary variables,andε_{iz} is an error term that is independently and identically distributed within the zone clusters. All regressions are OLS with linear functional form. In the case of binary dependent variables, we employed a probit specification and report the marginal effects.

In our regressions we omit the dummy variable for Corail, a high performing zone in all outcomes. The resulting point estimates for the zone dummies therefore have a common sign, facilitating analysis.

Membership in a wealth quintile is expressed by a dummy variable. As we expect the analysis to exhibit a trend with respect to wealth index, we omit the dummy variable for the first quintile in our regressions, allowing us to compare each of the included quintiles directly to the poorest quintile.

Where the empirical results include a cohort dummy variable, we have omitted the dummy for the first (earliest) cohort.

We employ cluster fixed effects in some specifications to control for unobserved zone coefficients, so the model estimates the effects of intra-cluster variation at the household level. Clustering standard errors recognizes that the stochastic error term will be independently distributed across the sample, but will only be identically distributed at the zone level.

We also present regressions omitting the zone fixed effects to check for the presence of household and beneficiary level effects across the full sample.

SECTION 7: RESULTS

Summary statistics are found in table 7.1. In general, program goats exhibit a low kidding rate and a high kid mortality rate. Average herd size is less than two goats and mean herd value is considerably less than what program administrators expect.

7.1 *Zone-level fixed effects*

Regression results are presented in tables 7.2 and 7.3.

We find very strong zone level effects on all outcomes. Darbonne, the most peri-urban zone we studied suffered much lower kidding rates and much higher mortality rates when compared to Corail, the highest performing zone as measured by herd size. Mithon, the most rural zone, exhibited kidding rates much higher than the sample mean and higher than Corail, while achieving a much lower kid mortality rate.

In some cases zone level effects accumulate. For instance, herd size and herd value are lower in Darbonne because kid mortality rates are so much higher in Darbonne. In this sense, unobserved characteristics of Darbonne might not actually affect herd growth because those same characteristics have already contributed to mortality rate.

In many cases, residents of a zone enter the goat program simultaneously as a cohort. This may contribute to the strength of the zone effect in at least two ways. First, since many beneficiaries from a particular zone may have entered the program at the same time, it stands to reason that they would grow their herds at a similar rate. Beneficiaries belonging to cohorts that

Table 7.1: Summary Statistics by Zone

Variable	Full Sample	Corail	Darbonne	La Colline	Mapou	Orangers	Mithon	Fouyen
N	170.00	46.00	26.00	16.00	28.00	22.00	12.00	19.00
Age	37.96	37.89	33.27	32.81	39.64	40.68	44.92	38.95
	(16.32)	(16.58)	(12.00)	(15.47)	(17.59)	(17.07)	(13.34)	(19.98)
Education	7.11	7.52	7.69	8.25	6.36	6.73	5.67	6.61
	(3.44)	(3.30)	(2.57)	(3.49)	(3.93)	(3.88)	(3.17)	(3.43)
Female (%)	0.62	0.65	0.88	0.59	0.61	0.45	0.33	0.63
	(0.49)	(0.48)	(0.33)	(0.49)	(0.50)	(0.51)	(0.49)	(0.50)
Total Land[10]	0.47	0.42	0.40	0.32	0.29	0.81	0.54	0.70
	(0.80)	(0.53)	(0.57)	(0.33)	(0.39)	(1.03)	(0.83)	(1.64)
Kidding Rate (%)[11]	0.75	0.85	0.46	0.75	0.75	0.77	0.92	0.74
	(0.44)	(0.36)	(0.51)	(0.45)	(0.44)	(0.43)	(0.29)	(0.45)
Mortality Rate[12]	0.37	0.31	0.57	0.54	0.36	0.33	0.11	0.45
	(0.38)	(0.33)	(0.41)	(0.44)	(0.36)	(0.43)	(0.21)	(0.42)
Herd Size	1.69	2.00	1.23	1.50	1.71	1.50	2.42	1.47
	(1.14)	(1.14)	(0.95)	(1.46)	(1.01)	(1.10)	(0.79)	(1.22)
Herd Value[13]	2,930.00	3,743.48	1,973.08	2,562.50	2,754.29	2,609.09	3,958.33	2,560.53
	(2,112.25)	(2,269.55)	(1,641.05)	(2,582.80)	(1,927.60)	(1,882.22)	(1,503.15)	(2,054.51)
Farm Family[14]	102.00	27.00	9.00	9.00	20.00	16.00	9.00	11.00
Made Sale	26.00	12.00	1.00	1.00	4.00	2.00	3.00	3.00

Source: Author
Note: Standard deviations in parentheses.

[10] Total land is the all land, rented or owned, available to a beneficiary.
[11] Goat kidded is a binary variable (0 = no, 1 = yes) that indicates whether a beneficiaries donated goat successfully kidded. Here kidding rate is the mean of those binary variables (i.e., in the full sample 75% of the program goats kidded).
[12] We define kid mortality rate at the household level as the percentage of kid goats that died of sickness prior to weaning. Here mortality rate is the mean of the household rates (i.e. in the full sample the average mortality rate was 37%).
[13] Not a market value, but a personal valuation arrived at by engaging the beneficiary in a hypothetical bidding game for each goat in her herd.
[14] Defined as a family for which the beneficiary or at least one head of household identifies as a farmer.

Table 7.2: Health Outcomes,with and without Zone Fixed Effects

	Kidded	Kidded	Mortality	Mortality
Age	0.008	0.008	-0.003	-0.002
	(0.002)***	(0.003)***	(0.004)	(0.004)
Female	-0.005	0.051	-0.066	-0.110
	(0.033)	(0.060)	(0.063)	(0.040)**
Years Education	0.007	0.003	0.000	0.001
	(0.015)	(0.014)	(0.018)	(0.019)
2nd Quintile	-0.115	-0.135	-0.037	0.020
	(0.113)	(0.115)	(0.102)	(0.122)
3rd Quintile	-0.075	0.069	0.068	0.074
	(0.150)	(0.114)	(0.095)	(0.123)
4th Quintile	-0.189	-0.136	0.107	0.148
	(0.131)	(0.144)	(0.089)	(0.098)
5th Quintile	-0.139	0.027	0.184	0.188
	(0.158)	(0.121)	(0.087)*	(0.095)*
Land (hectares)	-0.014	-0.017	-0.077	-0.093
	(0.038)	(0.039)	(0.034)*	(0.041)*
Cash on Hand	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Available Credit	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Farming HH	0.009	-0.021	-0.026	0.016
	(0.093)	(0.076)	(0.068)	(0.084)
Darbonne		-0.516		0.248
		(0.051)***		(0.055)***
La Colline		-0.124		0.105
		(0.048)**		(0.041)**
Mapou		-0.208		-0.024
		(0.073)***		(0.039)
Orangers		-0.112		0.004
		(0.037)***		(0.034)
Mithon		0.069		-0.190
		(0.025)***		(0.056)**
Fouyen		-0.020		0.198
		(0.057)		(0.044)***
Constant			0.549	0.472
			(0.274)*	(0.311)
N	164	164	124	124
R^2			0.10	0.18

*p<0.1; **p<0.05; ***p<0.01

Table 7.3: Production and Marketing Outcomes

	Herd Size	Herd Size	Herd Value	Herd Value	Sale Made	Sale Made
Age	0.004	0.002	-5.377	-12.263	0.002	0.002
	(0.013)	(0.013)	(18.924)	(19.753)	(0.001)	(0.002)
Female	-0.150	-0.121	-214.688	-174.466	0.040	0.029
	(0.293)	(0.235)	(853.934)	(791.688)	(0.066)	(0.066)
Education	0.009	-0.006	-36.688	-99.339	0.007	0.004
	(0.055)	(0.056)	(87.248)	(102.521)	(0.004)*	(0.006)
2nd Quintile	-0.244	-0.372	-55.866	-367.115	-0.022	-0.007
	(0.199)	(0.199)	(499.292)	(503.262)	(0.159)	(0.167)
3rd Quintile	-0.120	-0.149	-474.645	-323.926	0.005	0.047
	(0.385)	(0.416)	(678.452)	(568.606)	(0.109)	(0.126)
4th Quintile	-0.392	-0.594	-1,093.649	-1,481.860	0.064	0.093
	(0.251)	(0.243)*	(357.439)**	(375.956)***	(0.121)	(0.145)
5th Quintile	-0.612	-0.678	-905.312	-703.448	-0.128	-0.093
	(0.249)**	(0.283)*	(286.822)**	(313.861)*	(0.056)**	(0.079)
Land (hect)	0.137	0.204	65.340	214.784	-0.010	-0.011
	(0.082)	(0.091)*	(257.187)	(266.647)	(0.034)	(0.036)
Cash	0.000	0.000	-0.043	-0.046	-0.000	-0.000
	(0.000)	(0.000)	(0.123)	(0.154)	(0.000)	(0.000)
Credit	-0.000	-0.000	-0.078	-0.088	0.000	0.000
	(0.000)	(0.000)	(0.078)	(0.086)	(0.000)**	(0.000)*
Farming HH	0.144	0.032	-97.115	-255.911	0.035	0.036
	(0.219)	(0.244)	(327.825)	(322.610)	(0.065)	(0.069)
Constant	2.162	2.581	4,819.810	6,198.085		
	(0.882)**	(0.908)**	(1,776.39)**	(1,953.59)**		
R^2	0.11	0.16	0.09	0.16		
N	124	124	124	124	124	124
Village FE	No	Yes	No	Yes	No	Yes
Cohort Controls	Yes	Yes	Yes	Yes	Yes	Yes
Spec.	OLS	OLS	OLS	OLS	Probit	Probit

*p<0.1; **p<0.05; ***p<0.01

entered the program later would naturally have smaller, less valuable herds than those belonging to cohorts that entered the program earlier. Second, beneficiaries belonging to the same zone and the same cohort might have experienced shocks that affected their kidding rates and mortality rates. They would have experienced the same floods, fires, droughts, or acute instances of pollution, for example, that caused a community wide change in goat health outcomes. Indeed, we see a pronounced difference between the first (2010) cohort and the fourth (2012) cohorts. Note that for the sake of brevity and clarity, table 7.3 omits zone effects and village fixed effects, but indicate whether they have been included among the controls.

As we continue to develop this paper, we will continue to search for viable explanations of the zone coefficients, perhaps by acquiring village-level data on such variables as zone leader experience, terrain, idiosyncratic environmental hazards, and market access.

7.2 *Wealth Effect*

Putting aside zone effects, we find that the poorest beneficiaries in the sample outperform the wealthiest. Before and after controlling for zone the fifth (wealthiest) wealth index quintile demonstrates a substantial and significant positive relationship to kid mortality when compared to the omitted first (least wealthy) quintile.

Turning to herd size and value, membership in the fourth and fifth quintiles both imply much lower herd sizes and values when compared to the first quintile. These differences are both economically and statistically highly significant.

In short, beneficiaries belonging to the poorest quintile as measured by a factor analytic wealth index build larger, more valuable herds than beneficiaries in the two wealthiest quintiles. There is no statistically significant wealth effect across the bottom three quintiles.

These findings contradict some of the prevailing development theory and our initial hypothesis. We considered the possibility that wealth effect and zone effects are aligned, but based on the results in table 7.4we tentatively reject that hypothesis. Within zones, membership in the five wealth quintiles is reasonably well distributed. While zones may skew towards one end of the continuum, there are few cases where a majority of a zone's beneficiaries are concentrated in a particular quintile. We offer a few possible explanations for this divergence from the literature.

Table 7.4: Wealth Quintile by Zone

Factor	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Mean
Corail	10.00	12.00	9.00	12.00	3.00	2.70
Darbonne	2.00	2.00	9.00	4.00	9.00	3.62
La Colline	2.00	0.00	1.00	5.00	8.00	4.06
Mapou	2.00	1.00	9.00	5.00	11.00	3.79
Orangers	8.00	6.00	3.00	3.00	2.00	2.32
Mithon	3.00	7.00	0.00	2.00	0.00	2.08
Fouyen	7.00	6.00	3.00	3.00	0.00	2.11

Notes: Shows the beneficiaries from each zone break down by wealth quintile.

First, goats are a thoroughly internalized benefit. Conversely, many of the other studies examine an intervention where many of the benefits manifest as a positive externality (e.g. deworming, ITNs, etc.).

Alternatively, the greater herd sizes and herd values might be explained by more limited asset holdings among the poorest as well as fewer alternative streams of income. Essentially, they may care about their goats more than the wealthiest beneficiaries and build their herds to a higher size. Our theoretical model also supports this explanation, as the presence of a compelling alternative to goat production may cause wealthier individuals to devote fewer resources to their goat herds. This hypothesis is also supported by the fact that the mean per-goat

valuation is highest in the lower quintiles and generally decreases in quintile (from 1755 HTG in the 1st to 1293 HTG in the 5th) (Table 7.5).

Table 7.5: Personal per-Goat Valuation, by Wealth Quintile

	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile	Sample Mean
Mean Value/Goat	1,755.51	1,882.11	1,803.06	1,356.13	1,293.38	1,610.43
	(0.661)	(1.211)	(0.929)	(-1.324)*	(-1.610)**	

Note: T-test values in parentheses. *p<0.1, **p<0.05, ***p<0.01

We see a suggestion of our hypothesized cash effect on herd size when zone is not controlled for. The effect is positive and significant, albeit tiny and not economically significant.

7.3 *Land Effect*

We find a strong land effect on herd size and on kid mortality. Having controlled for zone, ownership of each additional hectare of land reduces expected kid mortality rate by 10%.

Land access also affects herd size, with each additional hectare of land access increasing expected herd size by 0.17 goats, controlling for zone fixed effects. We find this effect intuitive: more land means more space to graze or grow fodder, and may imply freedom from environmental hazards sometimes present in more densely populated places.

A strong and significant land effect comports with our hypothesis and with the literature relating productive asset complementarities and poverty thresholds. In the language of Barrett (2005) and Foster (2011), goats and land combine to form an asset complementarity that allows beneficiaries to take advantage of a cargo net intervention.

7.4 *Female Beneficiaries and Kid Mortality*

Female beneficiaries exhibit kid mortality rates 11% lower than male beneficiaries.

The exact cause of this phenomenon remains unclear at this time; it may relate to the traditional division of labor within Haitian households, or it may reflect the generalization that women are more nurturing than men. Alternatively, it may point out a greater willingness on the part of female beneficiaries to invest in the welfare of their goats, which may come from a lack of alternative economic activities (compared to men). In any case, this finding validates GHA's strategy of focusing on female beneficiaries.

SECTION 8: CONCLUSIONS

A goat may not be the best intervention for everyone.Based on evidence presented here, wealthier beneficiaries are likely to grow their herds to a smaller size and value than the poorer beneficiaries. Beneficiaries with access to larger tracts of land experience significantly lower mortality rates. While the findings regarding wealth are somewhat counterintuitive, they stand to reason: beneficiaries internalize more of the benefits of a goat program when compared to other classes of intervention, and it is possible that the poor beneficiaries value their goats more highly because they lack some of the alternatives enjoyed by wealthier beneficiaries.

The converse is the notion that the wealthier beneficiaries care less for their donated goats because they have alternative sources of income. Taken together, these finding would suggest that program administrators should focus on poorer beneficiaries with good land access for optimal efficiency, and consider other interventions for wealthier beneficiaries.

REFERENCES

Bandiera, O., R. Burgess, N.C. Das, S. Gulesci, I. Rasul, and M. Sulaiman. "Can Basic Entrepreneurship Transform the Economic Lives of the Poor?". Bonn. IZA Discussion Paper.

Banerjee, A., E. Duflo, R. Chattopadhyay, and J. Shapiro. 2011. "Targeting th Hard-Core Poor, An Impact Assessment". Working Paper. MIT.

Banerjee, A.V., and E. Duflo. 2008. "Mandated empowerment: handing antipoverty policy back to the poor?" *Ann N Y Acad Sci* 1136:333-341.

Barrett, C.B. 2005. "Rural poverty dynamics: development policy implications." *Agricultural Economics* 32:45-60.

Carter, M.R., and C.B. Barrett. 2006. "The economics of poverty traps and persistent poverty: An asset-based approach." *The Journal of Development Studies* 42:178-199.

De Vries, J. 2008. "Goats for the poor: Some keys to successful promotion of goat production among the poor." *Small Ruminant Research* 77:221-224.

Devendra, C., and C. Chantalakhana. 2002. "Animals, poor people and food insecurity: opportunities for improved livelihoods through efficient natural resource management." *Outlook on Agriculture* 31:161-175.

Foster, W., A. Valdés, B. Davis, and G. Anríquez. 2011. "The Constraints to Escaping Rural Poverty: An Analysis of the Complementarities of Assets in Developing Countries." *Applied Economic Perspectives and Policy* 33:528-565.

Hoffmann, V., C.B. Barrett, and D.R. Just. 2009. "Do Free Goods Stick to Poor Households? Experimental Evidence on Insecticide Treated Bednets." *World Development* 37:607-617.

J.M.K. Ojango, C.A., A.M. Okeyo and J.E.O. Rege (2010) "The FARM-Africa dairy goat improvement project in Kenya: A case study." In.

Kremer, M., and E. Miguel. 2007. "The Illusion of Sustainability." *The Quarterly Journal of Economics* 122:1007-1065.

Lebbie, S.H.B. 2004. "Goats under household conditions." *Small Ruminant Research* 51:131-136.

Peacock, C. 2005. "Goats—A pathway out of poverty." *Small Ruminant Research* 60:179-186.

Pimkina, S., R. Rawlins, C. Barrett, S. Pedersen, and B. Wydick. 2014. "Got Milk? The Impact of Heifer International's Livestock Donation Program in Rwanda on Nutritional Outcomes." *Food Policy* 22:202-213.

Scott, L., R. Islam, and M. Marks. 2007. "Asset Transfer: a road out of extreme poverty." *Initial Findings from the Experimental First Phase of CLP's Asset Transfer Programme, Innovation, Monitoring and Learning Division Chars Livelihood Programme, Bangladesh*.

APPENDIX: SURVEY OF GLOBAL HEALTH ACTION BENEFICIARIES

The following is a script of the survey delivered to obtain the data used in this thesis. Note that the survey was conducted electronically and no conventional paper form were ever developed. Questions are written in bold, and where applicable are followed by a value set of responses. Instructions to the enumerators are italicized.

IDENTIFICATION INFORMATION

ID1: **Please enter the name of the closest village:**

1 = Beaucejour; 2 = Corail; 3 = Darbonne; 4 = La Colline; 5 = Mapou; 6 = Orangers

ID1A: **Enter the household ID (HHID). The household ID is the 2 digit village code followed by the 3 digit beneficiary code.**

ID2: **Please enter the GPS coordinates (degrees N latitude).**

ID2A: **Please enter the GPS coordinates (degrees W longitude).**

ID3: **Select the name of the enumerator completing this survey.**

1 = Andre, D.; 2 = Dorvilier, V.; 3 = Jean, M. G.; 4 = Joseph, J.; 5 = Josaphat, S.

ID4: **Enter today's date in DDMMYY format.**

INFORMED CONSENT

IC1: Please read the following informed consent form to the respondent, then indicate whether the respondent has understood the document and wishes to continue the interview:

Thank you for the opportunity to speak with you. We are a research team from the University of Georgia working in collaboration with Global Health Action. We are asking questions about the goat program that you participate in. Answering these questions is entirely voluntary. You can refuse to answer questions or stop answering questions at any time without penalty or loss of benefits to which you are otherwise entitled. This means that your decision to talk with us or not will have no effect on your current or future participation in this program or other programs like it. Your identity will be kept confidential; we will not share information that identifies you with anyone outside the research team unless required by law.

We do not think that being a part of this research study will cause you any harm or discomfort. If you agree to participate, you can skip any questions you do not want to answer.

We will also interview other households in your community and in other parts of Haiti. After we collect all the information we will use it to study ways to improve the goat program and other programs like it to help more people in your community and other parts of Haiti. Do you have any questions about the study or what I have said?

The researchers conducting this study are: Dr. Nicholas Magnan and Mr. William M. Thompson. You may ask any questions you have now. If you have questions later, you are encouraged to contact them at 301 Conner Hall, University of Georgia, Athens GA, 30602; telephone (706) 542-2481; email nmagnan@uga.edu and willt78@uga.edu. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 629 Boyd GSRC, Athens, Georgia 30602-7411; telephone (706) 542-3199; email address irb@uga.edu.

HOUSEHOLD ROSTER

(*to be completed for each person living in the household, and those temporarily away*)

HHR1: Enter the household member's first name.

HHR2: Enter the household member's last name.

HHR3: How is [*person*] related to the beneficiary?

1 = Beneficiary; 2 = Spouse; 3 = Child; 4 = Grandchild; 5 = Parent; 6 = Aunt/Uncle; 7 = Sibling;

8 = Cousin; 9 = Parent-in-Law; 10 = Brother/Sister-in-law; 11 = Other

HHR4: How old is [*person*]?

HHR5: What is [*person's*] gender?

0 = Male; 1 = Female

HHR6: What is the highest level of school completed by [*person*]?

1 = Primary School; 2 = Secondary School; 3 = Professional School; 4 = University; 5 = None

HHR7: What has [*person's*] primary activity been over the past 12 months?

1 = Farmer; 2 = Housework; 3 = Student; 4 = Driver; 5 = Priest/Minister; 6 = Market Woman; 7 = Teacher; 8 = Building Trades; 9 = Office Worker; 10 = Fisherman; 11 = Other

EDUCATION

(*to be completed for each school age)*

ED1: Does [*person*] currently attend school?

1 = Yes; 0 = No

ED2: **Why did [*person*] stop going to school?**

1 = Finished School; 2 = No further benefit; 3 = Dropped out to work full time;

4 = Dropped out to care for children; 5 = Dropped out for lack of money

ED3: **Including tuition, fees, books, and uniforms, how much did it cost to send [*name*] to school last year?**

ED4: **How much does transportation for [*name*] to and from school cost each week?**

GOAT ACTIVITIES

GA1: **Does [*name*] participate in goat rearing?**

1 = Yes; 0 = No

GA2: **Is [*name*] the primary caregiver for at least one goat?**

1 = Yes; 0 = No

GOAT PROGRAM, GENERAL

GP1: **How did you first hear about the goat program?**

1 = Family member; 2 = Neighbor; 3 = Zone leader; 4 = Church; 5 = Farmers' Association; 6 = Other

GP1A: **Did you hear about the goat program from a particular person?**

Enter the name of the person the beneficiary heard about the goat program from.

GP1B: **Do you recall the name of the program that provided you with your goat and training?**

1 = Yes; 0 = No

GP1C: *Please enter the specific name the beneficiary uses to refer to the program.*

GP1D: **Do you know of any other organizations in your area that offer a similar goat program?**

1 = Yes; 0 = No

GP2: **What church do you belong to?**

Enter the name of the church the beneficiary belongs to.

GP3: **Have any other members of your family participated in the Global Health Action goat program?**

1 = Yes; 0 = No

GP4: **Did any other members of your household attend the Global Health Action training sessions?**

1 = Yes; 0 = No

PROGRAM GOATS (ROSTER)

(*collect a complete record of all goats originating from the donated doe, including the doe itself*)

PG1: ***Indicate the generation of program goats the subject goat belongs (i.e. 1, 2, 3. If it is the original donated goat, enter zero).***

PG1A: **What is the sex of this goat?**

1 = Female; 0 = Male

PG1B: **Was this goat generally healthy or sickly prior to weaning?**

1 = Health; 2 = Sickly

PG1C: **When was this goat born?**

Enter the month and year in MMYY format.

PG1D: Which best describes this goat's father?

1 = GHA buck; 2 = Other improved buck; 3 = Haitian buck

PG2: Do you still own this goat?

1 = Yes; 0 = No

PG2A: What did you do with this goat?

1 = Gave to GHA; 2 = Sold at market; 3 = Sold to a neighbor; 4 = Bartered; 5 = Slaughtered; 6 = Died of disease; 7 = Ran away; 8 = Stolen; 9 = Gifted; 10 = Unknown

PG2B: Who decided what to do with this goat?

1 = I decided alone; 2 = I decided with the other head of household;

3 = The other head of household decided

PG2C: Why did you decide to sell or barter this goat?

1 = To buy food; 2 = To buy medicine; 3 = To pay school fees; 4 = To pay debts;

5 = To pay rent; 6 = To buy farming supplies; 7 = To buy a durable asset;

8 = To buy a productive asset; 9 = To buy land; 10 = To buy farming inputs;

11 = To buy livestock inputs; 12 = To buy other livestock

PG2D: To whom did you sell or with whom did you barter this goat?

1 = Butcher; 2 = Another farmer; 3 = Larger goat herder; 4 = Market woman

PG2E: For how much money did you sell this goat?

PG2F: Who received the money from the sale of this goat?

1 = I received the money; 2 = The other head of household received the money

PG2G: **At which market?**

1 = Beaucejour; 2 = Corail; 3 = Darbonne; 4 = La Colline; 5 = Mapou; 6 = Orangers;

7 = Other

PG2H: **What did you barter for?**

1 = Services; 2 = Household goods; 3 = Farm supplies; 4 = Other livestock; 5 = Settle a debt

PG2I: **When did you sell/barter this goat?** ***Enter month and year in MMYY format.***

PG2J: **Would you be willing to sell this goat for [*HTG*]. *Starting with 1000 HTG, increase the hypothetical sales price in 500 HTG increments until the respondent accepts a price.***

PG3: **Did you breed your original doe again? How many times?**

Record the number of times.

PG3A: **Did you breed this doe? How many times?**

Record the number of times.

PG4: **How many times has this doe been pregnant then miscarried?**

Record the number of times.

PG4A: **How many male offspring has this doe given birth to?**

PG4B: **How many female offspring has this doe has given birth to?**

PG4C: **What is the total number of offspring this doe has given birth to?**

Add PG4A to PG4B.

COSTS OF GOAT OWNERSHIP

COG1: Do you purchase fodder for your goats?

1 = Yes; 0 = No

COG1A: How much money do you spend on fodder in a normal week?

COG2: Do you graze your goats?

1 = Yes; 0 = No

COG2A: How much time (*in minutes*) does it take to move your goats to and from their grazing places?

COG3: Do you feed your goats crop residues?

1 = Yes; 0 = No

COG3A: What would you have done with your crop residues before you had goats?

1 = Sold them; 2 = Burn for fuel; 3 = Use as mulch; 4 = Leave for neighbors;

5 = Did not have residues

COG4: Do you have a shed, pen, or other enclosure for your goats?

1 = Yes; 0 = No

COG4A: Did you have the shed or pen before starting the goat program?

1 = Yes; 0 = No

COG4B: How much time did it take to build the shed or enclosure?

Record the answer in minutes.

COG4C: What did the materials to build the enclosure cost?

Record the amount in HTG.

COG5: How many times has a veterinarian or animal health worker visited your farm to care for your goats since you started the program?

COG5A: How much money does the vet or animal health worker charge per visit?

Record the amount in HTG.

COG6: Since you started the program, how many times have you had to buy medicine for your goats?

COG6A: In total, how much money have you spent on medicine?

Record the amount in HTG.

COG7: Do you trim your goats' hooves yourself or do you have someone else do it?

1 = Yes; 0 = No

COG7A: How many times have you paid for hoof trimmings?

COG7B: How much do you normally pay for a hoof trimming?

Record the amount in HTG.

COG7C: Since starting the goat program, have you bought any special tools for caring for your goats, such as trimming tools?

1 = Yes; 0 = No

COG7D: Can you estimate the cost of these tools?

Record the amount in HTG.

COG8: Over the past year, have you paid for breeding services for your female goats?

1 = Yes; 0 = No

COG8A: On average, what do you pay for breeding services?

Record the amount in HTG.

COG8B: Over the past year, how frequently did you pay for breeding services?

Record the number of occurrences.

COG9: Over the past year, have you provided breeding services to other goat owners?

1 = Yes; 0 = No

COG9A: How much do you charge to provide breeding services?

Record the amount in HTG.

COG9B: Over the past year, how frequently have you been paid for providing breeding services?

Record the number of occurrences.

COG9C: Which family member receives the money from the breeding services?

1 = I do; 2 = Other head of household

COG10: Please list any other materials you have had to buy in order to raise goats.

FORAGE

FG1: Do you grow forage crops for your goats?

1 = Yes; 0 = No

FG2: How much land do you use to grow forage crops?

Record the amount of land in centimes.

FG3: How would you have used that land before you started the goat program?

1 = For another crop; 2 = Land was unused; 3 = Didn't have land

CROPS

CRP: **Indicate from the following list which crops you grow:** ***corn, beans, rice, mangoes, wheat, sorghum, barley, yams, millet, plantains, carrots, aubergines, watercress, groundnuts, sugarcane, cabbage, spinach, melons, peppers, oranges, grapefruit, onions.***

LIVESTOCK

LST1: **How many goats are in your herd today, not including program goats?**

LST2: **How many dairy cattle are on the household farm today?**

LST3: **How many beef cattle are on the household farm today?**

LST4: **How many pigs are on the household farm today?**

LST5: **How many horses do you own?**

LST6: **How many donkeys do you own?**

LST7: **How many chickens are on the household farm today?**

LST8: **How many turkeys are on the household farm today?**

LST9: **How many beehives are on the household farm today?**

LST10: **Please list any livestock not listed above.**

ASSETS

AST1: **What material are the walls of your house made of?**

1 = Straw; 2 = Wood; 3 = Brick; 4 = Block; 5 = Tarp, 6 = Anti-seismic

AST1A: **Are the exterior walls of your house painted?**

1 = Yes; 2 = No

AST2: What material is the roof of your house made of?

1 = Metal; 2 = Straw; 3 = Block; 4 = Tarp

AST2A: What material are the floors of your home made of?

1 = Dirt; 2 = Concrete; 3 = Ceramic

AST2B: How many rooms are in your house?

AST3: What best describes the main source of drinking water for your household?

1 = Rainwater; 2 = River or stream; 3 = Purchase bottles; 4 = Pipes in house;

5 = Public Fountain/Faucet; 6 = Well (public); 7 = Well (private)

AST4: How much farmland does your household own?

Record the amount of land in centimes.

AST5: How much farmland does your household rent?

Record the amount of land in centimes.

AST5A: What rental rate do you pay on your rented farmland?

Record the rate for the 5-7 year rental term in HTG.

AST5B: How long ago did you make your last rental payment?

Answer in months.

LIQUIDITY & CREDIT

LAC1: The last time you need (*human*) medicine, what did you do?

1 = Couldn't pay; 2 = Paid from savings; 3 = Borrowed money; 4 = Credit; 5 = Sold an asset

LAC2: The last time you had to pay school fees (including books and uniforms) what did you do?

1 = Couldn't pay; 2 = Paid from savings; 3 = Borrowed money; 4 = Credit; 5 = Sold an asset;

6 = Not responsible for school fees

LAC3: The last time you needed to have a veterinarian care for your livestock, what did you do?

1 = Couldn't pay; 2 = Paid from savings; 3 = Borrowed money; 4 = Credit; 5 = Sold an asset

LAC4: If you had an emergency and you needed [*HTG*], would you be able to pay with money you have already?

Starting at 500 HTG, increase amount in increments of 500 HTG until you arrive at a maximum.

LAC5: If you had an emergency and needed [*HTG*] would you be able to borrow it?

Starting at 500 HTG, increase amount in increments of 500 HTG until you arrive at a maximum.

LAC5A: From whom would you borrow the money?

1 = Bank; 2 = Relative or friend; 3 = Informal money lender; 4 = Other

LAC6: Do you have a bank account?

1 = Yes; 0 = No

LAC6A: What kind of bank account do you have?

1 = Formal; 2 = Informal