

# Evaluating the Cost Effectiveness of Heifer International Country Programs

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Paul Clements  
*Western Michigan University*

**Background:** In the 1950s and '60s cost effectiveness was the primary focus of evaluation of international development aid, but in recent decades this has been increasingly neglected. The most recent decade saw great interest in impact evaluation, but the step from impacts to cost effectiveness was often neglected. This article explains how a multi-year evaluation of a major international NGO that was designed to estimate country program impacts was expanded to include estimates of cost effectiveness.

**Purpose:** The article explains the importance and illustrates the practicability of evaluation for cost effectiveness. It describes the evaluation's methodology and presents its major finding, that Heifer International is highly cost effective in improving the income, assets and nutrition of poor households in Albania, Nepal and Uganda.

**Setting:** The article focuses mainly on the 2011 evaluation of the Heifer International country program in Uganda.

**Intervention:** The evaluations focused on usually three to five year projects of usually a few dozen to a few hundred households, but the evaluation itself did not conduct interventions (beyond its interviews).

**Research Design:** The original multi-year impact evaluation was based on purposeful selections of eight to twelve projects per country program. Projects were evaluated in terms of impacts on basic needs, livestock care and management, education for a just and sustainable world, empowerment of family and community, and systems and policy improvement. Impacts were estimated at the project level based on interviews with randomly selected households, group leaders and group members.

To add evaluation of cost effectiveness, the focus was changed from the project to the household level and evaluators estimated changes in income, assets and nutrition due to the project. Estimates of income impacts were then used as the primary basis for estimating the cost effectiveness of the respective country program (although assets and nutrition were also considered).

**Data Collection and Analysis:** Data were collected through two and a half to three week country program evaluations by two or three evaluators and their translators. Group and household interviews were based on questionnaires, but they also required evaluators to pursue lines of inquiry to logical conclusions. Quantitative and qualitative factors were considered as a basis for impact estimates on scales from zero to five in the original evaluation and in terms of economic values for income and assets. Analysis was carried out largely with Excel spreadsheets.

**Findings:** Due to Heifer International's expenditure of about \$7 million over six years, about 8,500 Ugandan families are likely to experience income gains exceeding \$8.5 million a year on an ongoing basis and asset gains of about \$17 million. About 5,500 of their children are likely to avoid stunting due to nutritional shortfalls. For each \$1 expenditure by country programs in Albania, Nepal and Uganda, households can be expected to gain about \$2.35, \$1.19 and \$1.25 in the respective country programs on an ongoing basis once the projects reach the maturity profile of those included in the evaluation.

**Keywords:** *cost effectiveness; impact evaluation; Heifer International; livestock; fertilizer*

## Introduction

I joined the impact evaluations of Heifer International (HI) country programs conducted by Western Michigan University's (WMU's) Evaluation Center in 2007, the third year of the series. I was asked to lead the Tanzania evaluation, working with Krystin Martens, an evaluation doctoral student at WMU, and two translators. Our evaluation was based mainly on the instrument developed by Dr. Michael Scriven, the evaluation's principal investigator, and his team, that had been applied in the two prior years and that WMU teams have continued to apply, with minor modifications, to evaluations of HI country programs in each subsequent year through 2011. While conducting the Tanzania evaluation I elaborated on the established methodology, adding a component to permit an estimate of the country program's cost effectiveness. In 2008 I employed this methodology in the evaluation I led of HI's Ghana program, and again in 2009 in the Philippines. In 2010 only one country program was evaluated by a WMU team and I was not involved with this evaluation. In 2011, however, WMU teams conducted evaluations of HI programs in Albania, Nepal, and Uganda, and I led the Uganda evaluation with Martens and Kurt Wilson (another evaluation doctoral student). That year HI asked me to expand on the methodology I had developed earlier, so I added an assessment of the assets households gained due to their participation in HI programs, and I made the established assessment of nutritional gains somewhat more rigorous and consistent. I trained the teams conducting the Albania and Nepal evaluations in this methodology and wrote a synthesis report on this component of the three country program evaluations.

This article presents and discusses the overall evaluation of HI country program cost effectiveness, including asset and nutrition components, focusing mainly on the 2011 Uganda evaluation. Happily we have generally found HI country programs to be highly cost effective (with some variation), particularly the Uganda program. The article explains the methodology and our findings, it defends and explains our conclusion that the HI country programs evaluated are generally highly cost effective, and it offers some tentative hypotheses as to how HI achieves these impressive results.

My motivation for adding a cost effectiveness component to the Tanzania evaluation came from earlier experience of the generally dismal state of evaluation in international development aid and

reflections on how this undermines learning and accountability in the development community. In my research, professional work, and teaching I have reviewed hundreds of development project evaluations, and while a few are excellent, generally the analytic quality is variable and often weak. Methodologies and units of measure are typically inconsistent even between similar projects, and, when evaluations do offer determinate estimates of impacts and cost effectiveness, more often than not I have found them to be positively biased. I have argued in this journal (2005, 2008) and in the *American Journal of Evaluation* (2008) that this inconsistency and positive bias undermines professionalism throughout the development community, and that professionalism could be greatly improved if independent, consistent, and strategically engaged evaluation for impacts and cost effectiveness were routine for development projects.

In international development aid, evaluation needs to support not only the management of individual projects, but also management of project portfolios. Effective portfolio management requires some idea of the relative cost effectiveness of an organization's projects: from a given expenditure, what is the impact? More cost effective projects generally indicate promising strategic directions, while failure to estimate cost effectiveness is likely to lead to ongoing inefficiencies. It is a challenge, however, to develop evaluation approaches that are comprehensive and reliable enough and where evaluations themselves are cost effective. If evaluations do not capture most of the interventions' relevant impacts, they obviously cannot provide a secure basis for portfolio management. Given measurement and methodological issues, however, many impacts are hard—or expensive—to estimate reliably. The question, then, is what evaluation approaches can provide good enough estimates of cost effectiveness at reasonable cost. The evaluations presently under consideration, for example, document changes on a range of indicators based on HI goals. They also provide rough estimates of beneficiary gains in income and even rougher estimates of gains in assets and nutrition for three Heifer International country programs and compare estimated impacts to overall country program expenditures. There certainly are established methodologies that could give more precise estimates of impacts in income, assets, and nutrition, but not within the framework of a three week evaluation.

The article concludes by discussing the potential role of evaluation for cost effectiveness, some limitations of the evaluations presently

under consideration, and the mutually supportive relationship between their cost effectiveness components and the pre-established evaluation design. These evaluations of HI country programs provide a partial example of the kind of evaluation I believe development assistance needs, and they serve their purposes remarkably well, but they still fall significantly short of what I take to be the practical and fully plausible ideal for aid evaluation.

## HI's Development Strategy and the Original WMU Evaluation Design

Since its founding in 1944, HI's strategy has been oriented around animal gifts to families. With operations today in over 50 countries, HI typically has tens to hundreds of projects in each country program carried out by teams made up of nationals from that country. Each project may involve tens to hundreds of families from a single village or community or from several communities in a region. A project begins with animal gifts to perhaps a dozen to a few dozen families, the original project members. In Uganda all families in a given project receive the same kind of animal; there are projects based on cows (possibly including bulls), pigs, goats, and fish ponds<sup>1</sup> In other countries a single project may involve a few kinds of animals. Before they receive their animal gifts at least one person from each member family participates in a series of training sessions, and the family must prepare a shed and typically plant fodder crops for the animal. HI promotes a zero-grazing approach to animal care—keeping animals in sheds avoids environmental damage from open grazing and it facilitates collection of manure for use as fertilizer and sometimes animal urine as a pesticide.

While HI aims to address poverty, in order to join a project a family needs to own enough land to sustain an animal, so HI cannot reach the poorest, landless families. We will see from findings about assets and nutrition that most families in projects evaluated in 2011 are poor; in Uganda at the time they joined the project most probably fell within the third to sixth deciles of the rural population in terms of income. Three quarters of Ugandan rural households have incomes below the national

average,<sup>2</sup> so we can be confident that most HI Uganda project families have incomes below the national average. Non-farm income (formal employment, wage labor) makes up only about ten percent of the average income of households in the lower two thirds of Uganda's rural income distribution,<sup>3</sup> so we can also be confident that most project families get most of their income from farming.

A central feature of HI's approach is called "passing on the gift." Each family that receives an animal agrees to "pass on" offspring equivalent to the gift they received. For example, if a family receives an in-calf heifer, when that cow has a female calf they are expected to raise it, have it impregnated, and, when it reaches the stage of the animal they received, give it to another family. Like the original recipients, families that receive a pass-on animal also participate in training, another central feature of HI's approach. Throughout the world HI training focuses on twelve "cornerstones," central values for HI projects:

1. Passing On The Gift
2. Accountability
3. Sharing and Caring
4. Sustainability and Self-Reliance
5. Improved Animal Management
6. Nutrition and Income
7. Gender and Family Focus
8. Genuine Need and Justice
9. Improved Environment
10. Full Participation
11. Training and Education
12. Spirituality

In Uganda, besides animal management, other training sessions that respondents often found particularly helpful involved composting manure for fertilizer, land management to improve water retention for crops, household sanitation and improved latrines, nutrition education, tree planting, vegetable gardens, and gender equity. The cornerstones on accountability, sharing and caring, and full participation focus particularly on the project group, which elects leaders, collects dues, helps to organize passing on the gift, and may undertake new development activities.

<sup>1</sup> Some families also receive rabbits and beehives, but our evaluation team did not visit any of these projects so they are not considered in our evaluation. Goat projects may be based on exotic dairy goats, exotic meat goats (Boer goats), or local goats, but we did not visit any projects based on local goats.

<sup>2</sup> UBOS. Report on the socio-economic survey, Uganda national household survey, 2002-03. Uganda Bureau of Statistics, Entebbe, Table 6.3.4, p. 51.

<sup>3</sup> Godfrey Bahiigwa, Dan Rigby, and Philip Woodhouse, "Right Target, Wrong Mechanism? Agricultural Modernization and Poverty Reduction in Uganda," *World Development*, 33:3, 481-496, Figure 3, p. 488.

In Uganda HI employs an extension worker to support each project usually for three years. Extension workers usually have veterinary training and live in the project area. After original project members are trained and have received their animal gifts, extension workers support the pass-on process and organize training for new members and additional training for established members. They provide veterinary care for project animals and they liaise with government agencies. Following the three years of active project management there are two monitoring years when Heifer Uganda provides limited oversight and encourages project groups to support their extension worker. After the monitoring years Heifer Uganda normally has little ongoing contact with project members, but members are expected to continue passing on animal gifts and to teach new members what they learned in their training.

The original WMU evaluation design was based on the twelve Cornerstones and also on the four goals and seven indicators that orient HI's international programs:

#### Four Goals

1. Food/Income Security
2. Environmental Integrity and Restoration
3. Education/Empowerment for Action in a Just/Sustainable World
4. Policies/Systems changed to support Goal 1

#### Seven Indicators

1. Food Security
2. Improved Environment
3. Net Income
4. Improved Gender Equity (includes youth)
5. Organizing and Action for Social Change
6. Strengthening Communities
7. Policy Changes

Before the first round of WMU evaluations, Michael Scriven synthesized the Cornerstones, goals and indicators into six value groups, and, on the basis of these value groups he designed an instrument for assessing impacts of HI projects. Each value group is represented by a set of indicators, and, for the first six years of the WMU evaluations, country programs were evaluated largely on the basis of project scores derived from estimated impacts for each indicator.

The six value groups represented in the instrument for evaluating HI projects are:

1. Basic Needs

2. Livestock Care and Management
3. Environment Care and Management
4. Education for a Just and Sustainable World
5. Empowerment of Family and Community, and
6. Systems and Policy Improvement

WMU evaluators made purposeful selections of eight to twelve mature projects for each country program to be evaluated. Teams of usually two external evaluators and two translators would visit each selected project and interview ten to twelve randomly selected member families and at least one non-member.<sup>4</sup> Typically one evaluator would interview project leaders (collectively) while the other interviewed group members not selected for individual interviews. Then the evaluators would visit the home of each randomly selected project member and interview usually the member, and, if present, the member's spouse and/or any adult children.

As noted above, although most interviews were conducted at the household level, for the first six years projects were scored at the project level. It was only in the seventh year, as we discuss below, with the evaluations' enhanced focus on cost effectiveness, that impacts for most indicators were estimated for member households, so estimates of project impacts came to be based mainly on average scores for impacts on randomly selected member households.

The value group for basic needs, for example, includes indicators in the areas of:

1. Year-Round, Adequate and Nutritious Food
2. Adequate Safe Water Year-Round
3. Adequate Shelter/Housing
4. Sustainable Income and Assets, and
5. Control and Reduction of Life Threatening Diseases

Each indicator area includes a selection of indicators, such as, for "Year-Round, Adequate and Nutritious Food:"<sup>5</sup>

1. Staples: corn, rice, beans, potatoes

<sup>4</sup> Some households very distant from group interview sites were excluded from the random selection due to excessive travel time, some were excluded when group members knew the adult residents had traveled, and no one was found home at a few selected households so these were replaced on a convenience basis.

<sup>5</sup> The first three of these indicators were modified for the 2011 evaluations.

2. Supplements: vegetables, milk and fruits
3. Protein: chickens, fish, cattle, goats, sheep
4. Efforts to improve strain or crop choice for the area
5. Adequate storage procedures

For the first six years, after completing interviews for a project, evaluators would meet to “score the project.” Each indicator was to be scored on a scale from zero to five, with zero representing a completely unacceptable situation and five representing a satisfactory situation based on the local culture and context. Following a rubric of scoring guidelines, evaluators would designate a point on the scale for a “reconstructed baseline”—their estimate of the situation for that indicator at the time the project started—and a second point for their estimate of the situation for that indicator at the time of the evaluation. For some indicators, such as those under “Systems and Policy Improvement,” which address HI’s impacts on systems and policies in the community, country, and wider world, the reconstructed baseline is normally zero. In case there were changes for a given indicator since the project started due to other factors besides the project, such as due to a government program or other changes in the community, these changes were added to the reconstructed baseline. For each indicator, therefore, the “current position” value minus the “reconstructed baseline” value represented the evaluators’ estimate of project impacts. Given the interview context, of course, estimates of the effects of non-project influences on indicators of project impact must be taken as very rough, although they would normally be significantly lower in magnitude than project influences. This is a reasonable approach in the context of a three week evaluation—impact estimates must be taken as fairly rough. Reconstructed baselines and current positions were summed across indicators to give baseline and impact scores by indicator, indicator area, and value group for projects and for country programs.

This evaluation design addresses the question, “How well is this country program achieving Heifer International’s goals?” The Cornerstones, goals and indicators from which the value groups were constructed represent the conditions HI aims to improve. The average of the sum of reconstructed baseline scores for projects evaluated in a country gives an estimate of the situation of Heifer project participants in that country with respect to these conditions before they joined Heifer projects (plus the effects of non-project factors). Average impact scores represent project impacts in the areas Heifer is trying to

address. Given that for each indicator a score of five, the maximum possible score, represents a satisfactory situation, considering all projects evaluated in a given country, the average of the sum of reconstructed baseline scores added to the average of the sum of impact scores<sup>6</sup> subtracted from the sum of maximum possible scores for all indicators (for a single project) gives an indicator of the distance remaining for project populations in that country until their conditions are satisfactory in all the areas HI aims to address.

The evaluation design is particularly helpful for HI managers to see how well they are improving the conditions they aim to improve and how far they still could go. Insofar as the selection of projects in each country is fairly representative, managers of HI’s international operations can see which countries are making greater progress. The design highlights differential starting points, as poorer countries, for example, are likely to have lower averages for their projects’ reconstructed baselines. Assuming evaluation teams in different countries are fairly consistent in their judgments of reconstructed baseline and current condition scores, international managers can see which country programs are having relatively greater impacts in improving, say, livestock care and management, as compared to, say, improving environmental conditions. Managers for country programs can see how their program is doing in each value area compared to other country programs, and they can see which of their projects (among those evaluated) are having greater impacts. Each evaluation also includes several recommendations for managers of the country program to consider. For example, we suggested that Heifer Uganda should maintain occasional contact with project groups after the monitoring period, perhaps with modest grants on a competitive basis, and we suggested that they establish groups in smaller geographic areas (with less distance between member households). Each year Michael Scriven has given HI a synthesis report on the year’s evaluations discussing areas in which HI’s overall operations might be improved.

### Additions to the Evaluation Design to Estimate Cost Effectiveness

The original evaluation design supports HI managers in assessing and comparing strengths and weaknesses of country programs and of projects within a given country, and it can support

<sup>6</sup> Or, equally, the average of the sum of present condition scores

reviews of many aspects of HI's approach. For stakeholders who are not intimately familiar with HI operations, however, and particularly for development professionals who have not worked with Heifer, the evaluation findings are likely to be somewhat opaque. Also, since the original evaluation design does not take account of costs, it cannot say much about the efficiency of country programs or of HI's operations overall. Development professionals generally need to consider what they can expect to achieve with a given stock of resources through one strategy as compared to another, and given one set of population and environmental conditions as compared to another. Also, potential contributors to a non-profit agency such as HI may be interested to know what impacts can be expected from a sum they might contribute.

To work out a basis for estimating cost effectiveness, I started by noting that HI projects are organized around animal gifts, and most economic gains for member families are attributable to the gift and its descendants. Country programs track the number and type of animals they give out each year, and it would be straightforward to associate country program expenditures with animal gifts. The question I began to consider in Tanzania was whether it would be possible to make fairly reliable estimates of member families' economic gains due to their participation in a project. The original evaluation instrument includes an indicator on "Adequate and sustainable household income," so I started to dig a little deeper with questions in this area. I soon found that I could work with respondents in household interviews to identify all their streams of income due to the project, and respondents seemed to be able to estimate yields and income gains and extra expenses in the last year for each income stream quite confidently.

Hence I reached, as a measure of cost effectiveness, the average cost to a country program of getting a cow, or cow-equivalent in other animals, to a household, compared to the average income gain to participant families in the year preceding the survey from a cow or cow equivalent. Or, for each dollar spent by a country program, what is the average annual economic gain for participant families once projects reach the maturity profile of those in our evaluations? This appeared to be the most powerful measure of HI's cost effectiveness for which I could get reasonably good data in the context of the established evaluation design.

The main challenge is to estimate economic gains for the family. As noted above, first one identifies income streams due to the project. When

the family has received a cow, these may include milk from the original animal gift and its offspring, increased crops due to fertilizer from the cows' manure, and sales of offspring from the animal gift or from its offspring. "Economic gains" are defined as the net economic value of increased production due to the project, whether sold or consumed by the family. Cash expenses in the last year, such as for medicines, vitamins to add to the animal feed, and visits by a veterinarian, are usually few, and respondents are usually easily able to remember these costs. One asks how many months in the last year the cow(s) provided milk, the maximum and minimum yield, and how much milk was given to the calf. Sometimes the respondent figures out where the questions are going and offers, for example, the number of months the calf was given milk, or how many months the milk yield was close to the minimum and how many close to the maximum. One asks the price the household usually received per liter of milk and applies this value not only to the milk sold but also to milk consumed by the family. The evaluator needs to think on his or her feet to collect the data that will allow a later calculation, usually at the end of the day, of the family's net gains for the year.

I was surprised that often over half a family's economic gains came from increased crop yields due largely to fertilizer from the animal manure. The zero grazing strategy is critical; before the project families had usually allowed any livestock they owned to range freely, often without collecting any manure. One asks how much land they have, how much is devoted to each crop, and to which crops they apply manure from the animals. One asks how many seasons they planted each fertilized crop in the last year, the total yield for each season, and how much they used to get per season before they started using the animal fertilizer. Most often they had not used any fertilizer before, but in case they had switched from chemical fertilizer, one asks the cost of the chemical fertilizer and the difference in yield. I was not surprised that respondents could usually remember yields and fertilizer costs even from several years prior quite confidently, as most member families are poor and these quantities are critical to their livelihoods.

Income attributable to the project also includes that from any income-earning assets purchased with income due to the animal gift, and income from other things the project provided such as vegetable seeds, tree seedlings, training in composting and entrepreneurship, and, in a few cases, biogas machines. For example, one family in Uganda near Jinja, along the main road between Kenya and Kampala, Uganda's capital, had been

given a cow. They passed on the first offspring, a female, but they still had the second, another female, and the third, a male. They had purchased some land with income from the milk and planted passion fruit vines. They fertilized the vines with manure from their cows and sold the fruit along the highway. This had dramatically increased their income, and we attributed the net income from the passion fruit business to the project. When income from other sources is mixed with income from the project to purchase income-generating assets, one attributes to the project a share of net income from these assets proportional to the share of the purchasing price derived from project sources. We do not attempt to calculate the value of household labor, whether for animal management, fertilizing and harvesting crops, or working on new businesses. Lacking a statistical basis for estimating the opportunity cost of labor, based on the logic of the rural economy we estimate it (very roughly) as perhaps fifteen percent of the income gained from project sources.

After working this methodology out in the course of evaluating HI's Tanzania program, I subsequently applied it to evaluations of HI programs in Ghana and the Philippines.<sup>7</sup> In 2011 HI asked me to further develop what they referred to as the "quantitative" part of the WMU team's evaluation design. (Impacts under the six value groups are also expressed quantitatively, but, as noted above, they do not support easy comparisons outside HI's operations.) Hence I added assessments of asset baselines and asset gains due to Heifer projects, and, as noted above, I further developed the nutritional assessments. This more fully elaborated methodology was applied to evaluations in Uganda (under my leadership) and in Albania and Nepal.

For assets, our teams made very rough assessments of respondent household assets at the time they received their animal gift, and somewhat more precise assessments of asset gains due to the project from that time up to the time of the interview. On arriving at the HI country office, teams worked with Heifer personnel to make lists of the kinds of assets typically found among beneficiary households and their typical prices. They asked Heifer personnel to suggest an asset profile for a household with a "satisfactory"

collection of assets—a household that would be considered to have altogether adequate assets in the context of the communities in which Heifer works in that country. They generated an asset scale for estimating baseline asset values by designating the sum value of this asset profile as a "5" for the baseline scale. Since all the indicators for the six value groups are scored on a scale from zero to five (rising in half units), for consistency we estimated baseline assets on this scale as well. The value for a "5" was \$50,000 in Albania, \$19,910 in Nepal, and \$21,000 in Uganda, with units from zero to five in fifths of these values. In Uganda, Heifer personnel estimated that about half a well-off household's assets might be in the value of their house and household effects, two fifths in land (including tree plantations), and the remaining ten percent or so in livestock.

The ten-point scale (from zero to five, in half units) accorded with the degree of accuracy with which I expected our teams to be able to estimate baseline asset values.

We would only be able to make very rough estimates, and this scoring system—in Albania, for example, to the closest \$2,500—would prevent us from suggesting a spurious degree of accuracy. In the course of each household interview, usually after discussing income streams from animal gifts, we would ask what assets the family owned at the time they received the animal gift and their approximate values at that time. Interviews were normally conducted at the home, so we could observe the house, the land, and other livestock. We might ask, for example, "If you had sold your land [or house or livestock] at that time, about what could you have got for it?" As expected, most of the value of "baseline assets" usually came from a respondent's house and land, with livestock a distant third. Usually we could sum the assets then and there and note the household's baseline asset score, but when there was a list of assets we might score it in the evening at our hotel. Asset and nutrition baselines help to show how far Heifer is reaching the poor.

After establishing the asset baseline we would work with the respondent to list the assets gained since receiving the animal gift due to income attributable to the project, and their values. At this point we would usually know the income gains in the last year and if there were likely to be many or few asset purchases. We would ask what assets they had purchased with the milk income, for example, or the income from increased crops due to the animal fertilizer, or to vegetable sales, if the project had helped them start a vegetable garden. Expenditures on health and education were also counted as assets on the grounds that they

<sup>7</sup> The evaluation team in Ghana also included Amanda Whiddon Robertson and in the Philippines Tererai Trent. Before this paper I have not deducted 15% from economic gains for the opportunity cost of labor on project-related activities, but I am convinced by comments from an anonymous reviewer and by further reading on Ugandan agriculture that this is appropriate.

contribute to the household's human capital. We would ask if money from any other source had been used to help with the purchase, and, if so, only attribute to the project that part of the asset price coming from project sources. If the animal gift had offspring, not including offspring to be passed on to another family, we would ask the value if they were sold at that time. These would count as assets attributable to the project, as would the original animal gift. Usually we would end up with a list of assets and their values; in the evening we would sum them to give the value of total assets gained due to the project. We did not adjust reported values or prices for inflation, but as with income, asset gains are reduced by fifteen percent to account for the opportunity cost of labor on activities related to the Heifer project.

We have noted that in the original evaluation design, nutritional gains were estimated at the project level. In the indicator area "Year-Round, Adequate and Nutritious Food," indicators for staples, supplements and protein, on scales from zero to five, were to be scored as follows:

1. Staples: corn, rice, beans, potatoes (0=No access to staples; 1=Severe shortage of staples year-round; 2=Severe shortage of staples for part of the year [e.g., preharvest or rainy seasons]; 3=Mild shortage of staples year-round; 4=Mild shortage of staples for part of the year; 5=Enough staples year-round) (5 pts)
2. Supplements: vegetables, milk, fruits (same as above) (5 pts)
3. Protein: chickens, pigs, fish, cattle, goats, sheep (same as above) (5 pts)

The standard measures for assessing development projects' nutritional impacts are weight-for-age, weight-for-height, and height-for-age for children from zero to five years of age compared to a reference group, but these require weighing and measuring children at different points in time. Given the constraints of our evaluation design we could not achieve this degree of precision, but to make our nutritional assessments somewhat more rigorous I suggested we assess impacts at the household level. Also, the rubric for scoring nutritional gains was changed to:

Staples: cereals (wheat, barley, rye, maize, or rice), starchy root vegetables (potatoes, yams, taro, and cassava), and special fruits (breadfruit and plantains)

- o. No access to staples

1. One meal of staples per day through much of the year, or two meals, but usually not enough to satisfy
2. Mild shortage of staples year-round
3. Two or three meals of staples per day year-round, but at least once a week, or for some period, such as a hungry season, not enough to satisfy
4. Three meals of staples per day year-round, but occasionally not enough to satisfy
5. Enough staples year-round

Supplements: vegetables and fruits

- o. No access to fruit or vegetables
1. One serving of fruit or vegetables once per day through most of the year
2. Severe shortage of fruit and vegetables for part of the year
3. Two servings of fruit or vegetables per day for most of the year
4. Three servings of fruit or vegetables per day throughout the year, rarely have less
5. Enough fruit and vegetable year-round

Protein

- o. No access to protein
1. One unit of protein or less per person per week
2. Three units of protein per person per week, shortage part of the year
3. One unit of protein per person per day, shortage part of the year
4. One unit of protein per person per day
5. Two or more units of protein per person per day

[One Unit of Protein: 3 oz. meat/poultry/fish; or 3 eggs; or 3 cups milk; or 3/4 cup (cooked) beans or split peas/lentils (dal) or soybeans; or 3 tablespoons peanut butter]

In the interview context we could not weigh food portions, and assessments along these scales inevitably included an impressionistic element, but this approach supported greater precision than previous, project-level assessments.

## Evaluation Results

In Uganda, for 95 member households interviewed, the average gain in income in the last year (as defined above) attributable to the Heifer project was \$1,454 (median \$1,011). The highest gain was \$3,365, for families that had received fish

ponds, and the lowest was \$728, for families that had received dairy goats. For the 42 families that had received cows, the average income gain was \$1,304. The eight projects my team visited were all more than three years old (into or past the monitoring stage), and respondent households had received their animal gift, on average, about three and a half years prior to the interview. Reducing these gains by 15% to account for the opportunity cost of their work associated with the project leads to an average gain of \$1,236 (median \$859). Considering that, according to the World Bank, Uganda's 2010 average per capita income was \$508 and most project families would have had below average incomes, these are very significant income gains. Note also that even though our methodology for estimating income gains depends on respondent recall, so it is not very precise, even if these results were off by ten or an unlikely twenty percent, it would not significantly alter the basic conclusion.

These economic impacts are clearly significant for member families, but do they represent a cost effective allocation of resources? Over the six years from fiscal year 04-05 to FY09-10, Heifer Uganda spent \$6,918,892 on its standard village projects (excluding expenses on two new and innovative kinds of project that our evaluation did not address), and during that period member families received 3,021 cows, 1,647 bulls, 1,573 dairy goats, 2,112 Boer goats, 78 fish ponds, and 165 pigs as original or pass on animal gifts (plus some rabbits, beehives, and local goats that we exclude from our analysis because we had no households that received these animals in our evaluation). Once projects with these animal gifts reach the maturity profile of the evaluated projects, assuming that gains for families with each kind of animal are similar to those found by the evaluation, recipient households can expect income gains totaling about \$8,506,000 per year,<sup>8</sup> or over \$25 million in three years. This represents only gains in income and food – there are also gains in assets and nutrition, as we discuss below, and impacts assessed by the original evaluation instrument such as in gender equity, community organization, and environmental sustainability. Even after taking account of overhead costs in HI's United States head office, the Uganda program clearly represents a highly cost effective use of resources.

The average asset baseline for families interviewed in Uganda, a very rough estimate of the value of household assets at the time they

received their animal gift, was \$5,900. Usually this consisted mainly of the value of their land and home. Asset gains due to the project averaged \$2,890 per household (median \$1,525), so families' total assets had risen, on average, by almost 50%, a little over twice the value of average income gains from the last year. (As one would expect, the distribution of asset and income gains does not fit the statistical normal curve; there are many households at the low end and a few households with gains many times higher than the average.) Applying our estimates to Heifer Uganda's national program, the sum of asset gains expected for all member families, once their projects fit the maturity profile of our sample, is about \$17 million.

Regarding nutrition, on a scale from zero to five, the average interviewed family went from a baseline of 2.9 to 4.4 for staples, from 2.0 to 4.0 for supplements (fruit and vegetables), and from 2.3 to 4.1 for protein. In 2006, the most recent date for which national statistics are available, 69% of Ugandans were unable to access adequate calories and 38% of children under five suffered from chronic malnutrition (stunting).<sup>9</sup> In this context of widespread under-nourishment, our findings for baseline nutritional standards are entirely plausible. They indicate that Heifer Uganda is reaching families that, on average, are significantly under-nourished. Even though our measurement approach is impressionistic and imprecise, estimated nutritional gains are so great that even a 30% error would not undermine the conclusion of substantial gains. Nutritional gains are expected not only from increased food production and income due to the animal gifts, but also due to nutrition education, improved sanitation (included in all projects), and from fruit trees and vegetable gardens that most projects promote.

Since project populations are poorer than the national average, and given evidence of pre-project nutritional standards from the evaluation's reconstructed baseline, it is likely in the absence of the Heifer projects, child malnutrition among project families would be significantly greater than the national average. We do not have enough information for statistical tests, but logically we can estimate that without the projects half of these families' children under five years of age would

<sup>8</sup> If our sample were a random selection from all Heifer Uganda families the 95% confidence interval would be from \$6,137,000 to \$10,875,000.

<sup>9</sup> FANTA-2. The Analysis of the Nutrition Situation in Uganda. Food and Nutrition Technical Assistance II Project (FANTA-2), Washington, DC: AED, 2010, p. iii. The percentage of adult Ugandans not gaining access to adequate calories has been rising despite statistics indicating declining national poverty rates.

probably be stunted. Given nutritional gains found by the evaluation, the proportion of stunted children is likely to be greatly reduced. Interviewed households at the time of the interview had cared for 182 children under the age of five since they received their animal gift, for an average of 1.9 children under five years per household. If we take it that at least a third of these children are not stunted now but would have been without the project, we find that at least 60 children in sampled households are likely to have avoided nutritional shortfalls leading to stunting because of Heifer projects.

During the period from fiscal year 2004-05 through FY2009-10, Ugandan families received 8,596 animals (or fish ponds) as original or pass-on gifts (excluding local goats, rabbits, and beehives) due to HI. While a few families received two animals, such as a male and female goat or pig, most families received only one. The number of families that received two animals is more than offset by the number of project families that received animals not included in the evaluation. These 8,596 families are likely to have about 16,332 children under five years of age, of which about 11,000 are likely to have been stunted in the project's absence. Assuming that members of Heifer projects across Uganda experience nutritional gains similar to those of sampled households, about 5,500 of these children are likely to achieve stature near their genetic potential (i.e. avoid stunting due to nutritional shortfalls) due to HI's Uganda projects.

In summary, due to HI's expenditure of about \$7 million over six years, about 8,500 Ugandan families are likely to experience income gains exceeding \$8.5 million a year on an ongoing basis and asset gains of about \$17 million. About 5,500 of their children are likely to avoid stunting due to nutritional shortfalls, and average nutritional standards for other family members are likely to be greatly improved.

This article presents impacts of HI's Uganda program based on the 95 households surveyed and, by extension, at the national level. These data indicate the overall cost effectiveness of HI's Uganda program. The Uganda evaluation report also presents results by project for the eight projects visited by the evaluation team, and by kind of animal. Managers of HI's Uganda program can be expected to possess knowledge of processes that contributed to differential impacts by project and type of animal gift, and the evaluation's impact information can help them to interpret this knowledge to strengthen management of ongoing and future projects and generally to improve management strategies.

Similarly, comparisons of evaluation results from different national programs can support HI's worldwide strategic management. Average household gains in income and food due to Heifer projects in the year before the evaluations were \$3,233 for Albania, \$486 for Nepal, and \$1,236 for Uganda (based on exchange rates at the time of the evaluations and assuming 15% opportunity cost of labor). In 2010, according to the World Bank, annual per capita incomes for these countries averaged \$3,960 for Albania, \$440 for Nepal (2009; 2010 not available) and \$508 for Uganda, so income gains were roughly 85% average annual per capita income in Albania, about one and a tenth times the average per capita income in Nepal, and nearly two and a half times average incomes in Uganda. However, most of the households participating in Heifer projects probably have incomes below the national average, and given total fertility rates (average births expected per woman during her lifetime) in 2009 of 1.9 in Albania, 2.8 in Nepal, and 6.3 in Uganda,<sup>10</sup> average household sizes are probably lowest in Albania and highest in Uganda. Average income gains represent a substantial proportion of household incomes in all three countries.

Most of the income gain experienced as a result of participation in a Heifer project can be traced to the animal gift a household receives. Table 1 shows the average gain in household income per animal gift by type of animal for the three countries evaluated in 2011 and for Ghana (2008) and Tanzania (2007).<sup>11</sup> For instance, the 115 households interviewed in Albania received a total of 84 cows, 33 dairy goats, and 30 bee hives. On average, each family that received a cow in Albania had experienced a \$4,027 gain in income (including increased food production, such as milk consumed by the family, corrected for a 15% opportunity cost of labor) traceable to the animal gift.

Income gains per animal were generally highest in Albania, partly reflecting higher cost structures in this middle-income country. Income gains per cow, for example, were \$4,027 in Albania, the highest gain per animal found by these evaluations, \$1,576 in Nepal (but based only on 4 cows), \$1,108 in Uganda, \$715 in Ghana (where the single project with cows was less than 2 years old), and \$654 in Tanzania. Income gains from goats, however, ranged from \$767 from dairy goats in Albania, to \$183 from goats in Nepal,

<sup>10</sup> <http://data.worldbank.org/indicator/SP.DYN.TFRT.IN>, accessed August 5, 2011.

<sup>11</sup> I exclude results from the Philippines because none of the projects evaluated there were more than three years old.

\$584 from dairy goats<sup>12</sup> and \$994 from Boer (meat) goats in Uganda, only \$24 from local goats in Ghana and \$346 from dairy goats in Tanzania. In this context gains from Boer goats (all from a single project in Uganda) were particularly impressive, while low gains from goats in Ghana reflect the lower value of local goats, high death rates for project goats in that country, Ghanaian farmers' relatively limited experience in livestock management, and, most likely, management weaknesses in the Heifer Ghana program.

It is notable that gains from pigs in Uganda, at \$849 per pig, are 10 times greater than the \$84 gains per pig (based only on 2 pigs) in Nepal.<sup>13</sup> The gain of \$2,862 per fish pond in Uganda is also notable; these fish ponds are much larger than the fish ponds in Tanzania where gains averaged only \$173.

At the time the animal gift was received, the average household owned assets worth on average about \$27,600 in Albania, \$3,200 in Nepal, and \$5,900 in Uganda (not counting assets above a value of 5 on the respective asset baseline scales). During the time between receiving an animal gift and being interviewed, households had gained additional assets (including health and education expenditures, minus 15% for the opportunity cost of labor) averaging \$4,768 in Albania, \$1,500 in Nepal, and \$2,890 in Uganda.

Table 1  
Average Income Gain in the Last Year  
per Animal

Country	Animal	Number of Animals	Average Income Gain (US\$)
Albania	Cows	84	\$4,027
	Dairy goats	33	\$767
	Bee hives	30	\$270
Nepal	Cows	4	\$1,576
	Buffalo	22	\$609
	Goats	140	\$183
	Pigs	2	\$84
Uganda	Cows	42	\$1,108
	Bulls	5	\$1,153
	Dairy goats	13	\$584
	Boer (meat) goats	11	\$994

<sup>12</sup> Income gains per goat are different from income gains per family in the dairy goat project because one family in this project received two goats (and similarly in the pig project).

<sup>13</sup> Pigs were being introduced on an experimental basis in Nepal, where it is not customary to eat pork.

	Pigs	13	\$849
	Fish ponds	12	\$2,862
Ghana (2008 evaluation)			
	Cows	11	\$715
	Goats	55	\$24
	Sheep	33	\$93
	Grasscutters	60	\$170
	Bee hives	132	\$15
	Chickens	570	\$22
Tanzania (2007 evaluation, partial coverage)			
	Cows	26	\$654
	Dairy goats	6	\$346
	Fish ponds	7	\$173

Sampled projects had started, on average, about six and a half years before the evaluation in Albania and seven years before the evaluation in Nepal and Uganda, so households are likely to have had similar periods of time to accumulate assets. Gains in assets are about 150% of gains in income from the last year in Albania, 310% of income gains in Nepal, and 230% of income gains in Uganda. Since average per capita incomes in Albania are almost ten times those in Nepal and Uganda (roughly on par with baseline assets), lower proportionate asset gains in Albania appear to reflect a somewhat greater propensity to consume additional income, while member households in Nepal had particularly high propensities to invest.

Estimated nutritional gains were slightly lower in Nepal and Albania than in Uganda. According to the World Health Organization, from 2003 to 2009 among children five years of age and below, 19% in Albania, 49% in Nepal, and 38% in Uganda suffered from moderate or severe stunting (low height for age) due largely to nutritional shortfalls,<sup>14</sup> so participants in Heifer projects in Nepal are likely to see reductions in stunting similar to those in Uganda, while those in Albania are likely to be somewhat less.

Regarding comparative cost effectiveness, for each \$1 expenditure by HI in Albania, once the projects are mature, households can be expected to gain \$2.35 per year in additional income (including food) and at least \$3.37 in total assets. For each \$1 expenditure in Nepal and Uganda, expected income gains are \$1.19 and \$1.25 a year respectively, and total asset gains \$3.18 and \$2.81. No information was collected on asset gains for Ghana or Tanzania, but expected annual income gains from each dollar of expenditure came to

<sup>14</sup> <http://www.unicef.org/infobycountry/index.html> (UNICEF website with data from the World Health Organization) accessed August 7, 2011.

\$0.32 for Ghana and \$0.54 for Tanzania. Over three years, from each dollar of country expenditure, income gains for participant households would average about \$7.07 in Albania, \$3.57 in Nepal, \$3.75 in Uganda, \$0.97 in Ghana, and \$1.61 in Tanzania. It might be instructive for managers of HI's worldwide operations to explore, for example, factors that contribute to making the Uganda program so much more cost effective (in economic terms) than the Ghana program.

## Discussion and Conclusions

Heifer International's overall cost effectiveness in the countries in which these evaluations were carried out, including its reach to poor families, reflects the soundness of its overall strategy as implemented in these countries. The largest part of the cost of most Heifer projects is in purchasing livestock for animal gifts; salaries for extension agents and costs for training and for inputs such as tree seedlings and vegetable seeds are significantly lower. Most project families are so poor that a cow, pig or goat represents a substantial opportunity. Training in areas such as sanitation, environmentally sustainable farming practices, and entrepreneurship lead to behavioral changes that complement livestock management in enhancing the families' livelihoods. Most families can add animal management to their farm activities without significantly diminishing their established farming practices. If they manage the animal gift well, and if they are fortunate, it can lead to expanding income streams based on the animal's offspring, the offspring's offspring, and investments from associated revenues. The pass-on process generates new animal gifts at little cost to Heifer, and it focuses the groups of project members. Groups often establish their identity around values from the Cornerstones, and groups typically take ownership of the project and move it in directions that suit their own purposes. These general dynamics, of course, play out differently from project to project and from country to country, but it is not surprising that altogether they sustain the overall magnitudes of impacts we have found in income, assets and nutrition.

The WMU Evaluation Center's evaluations were designed mainly as impact evaluations. Along the way evaluators learn bits and pieces about the processes that generate these impacts, but the evaluations were not designed to support well grounded assessments, for example, of why certain individual projects perform particularly well or poorly, or about strengths and weaknesses of management approaches adopted by different

country programs. The impact information provides a foundation for HI managers at country and international levels to draw on their existing knowledge of how variations in inputs and outputs generate the revealed patterns of impacts. It may help them to generate hypotheses and to pursue lines of inquiry to identify key causal factors, but this depends on managers' initiative and depth of perspective.

This series of evaluations has been carried out for seven years with the same principal investigator and overall evaluation manager, and many of the same evaluators from year to year. Each year evaluators are trained together in the United States before dispersing to the respective countries, and in the training sessions there is considerable discussion of applications of specific indicators based on prior years' experience. Nevertheless, given significant elements of judgment and variations in interview technique in applying most indicators, there is considerable scope for variation in evaluators' uncovering and interpreting evidence to arrive at particular scores within the six value groups and impact values regarding gains in income and assets. Given overall magnitudes of impacts these variations are probably relatively small and inconsequential in most cases, and it would certainly be far more expensive to employ more reliable methodologies. Many survey questions depend on respondent recall; this too must be taken into account when interpreting the results. Nevertheless, for purposes of HI managers and executives learning about their own programs, particularly with the addition of the cost effectiveness analysis, the methodologies are an enormous step forward.

For stakeholders outside HI, particularly for other professionals in the development community, these evaluations are much better than average, but they leave significant room for improvement. As noted above, the units in which indicators for the six value groups are expressed are not familiar or transparent for other development professionals. It will be apparent that some significant impacts are found in certain areas, but the units do not facilitate comparisons with impacts of similar projects carried out by other organizations. The evidence is clear that the evaluated projects are extraordinarily cost effective in increasing farmers' income and assets and enhancing their nutrition. Potential supporters can be confident that for some national environments and when the strategy is well implemented, contributions to HI will do more to enhance livelihoods of poor farmers than contributions to most other development agencies. Impacts on assets are expressed in monetary units that are

directly comparable with other projects. Interpretation of income impacts is complicated by the time dimension; neither the period between an investment and return nor the duration of gains is immediately apparent. It is clear that programs in Albania, Nepal and Uganda are extraordinarily cost effective in income terms, but comparisons with highly cost effective programs of other development agencies may be difficult. It is apparent that in Uganda there are great opportunities to address nutritional shortfalls and for poor farmers to enhance their livelihoods with projects involving the livestock-fertilizer nexus.

Evaluations would provide a stronger basis for learning and accountability across the development community if they could assess the cost effectiveness of similar programs in consistent units and with methodologies that were directly comparable. It would be helpful if evaluators for similar projects, such as those that focus on the livestock-fertilizer nexus, were familiar with evaluations of several organizations' work in this area, and if evaluators could work together to develop sensible and consistent responses to the methodological challenges that different kinds of projects present. For example, the present evaluations use non-standard units to assess nutritional gains, and the opportunity cost of the labor that household members devote to activities associated with the Heifer projects is estimated at 15% for all projects in all countries. These aspects of the methodology are reasonable given the resources available for these evaluations. Evaluation conclusions are robust enough, even given uncertainties inherent in the methodology, to support management judgments, and the value of evaluation findings would be significantly diminished if, in light of such methodological difficulties, the evaluations failed to estimate impacts in income, assets or nutrition. Nevertheless, if evaluators across the development community could work together to establish sensible compromises and heuristics in cases like these, it is likely that these methodologies could be improved.