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Provided by
Global Livestock Producers Program
of
EnterpriseWorks Worldwide

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1.0 Project Summary

This report constitutes the US Department of Energy and US Initiative on Joint Implementation (USIJI) - Activities Implemented Jointly (AIJ) - project report/proposal by the Global Livestock Producers Program of EnterpriseWorks Worldwide as outlined in the US Department of Energy grant number DE-FG02-97EE35036 "Ruminant Methane Reduction through Livestock Development in Tanzania."

This proposed project will help develop the USIJI activities in Eastern Africa. It has been communicated in meetings with representatives from the Ministry of Environment of Tanzania and the consultant group that developed Tanzania's National Climate Change Action Plan; the Centre for Energy, Environment, Science and Technology (CEEST), that this proposed project fits very well with the developmental and environmental goals of the Government of Tanzania (GOT).

The goal of this AIJ ruminant livestock project is to reduce ruminant methane emissions in Eastern Africa. The proposed project plans to establish a sustainable cattle multiplication unit (CMU) at Mabuki Ranch in the Mwanza Region of Tanzania. This CMU will focus on raising genetically improved animals to be purchased by farmers, developmental organizations, and other CMUs in Tanzania. Through the purchase of these animals farmers will raise their income generation potential and reduce ruminant methane emissions.

2.0 Scientific/Technical Aspects Addressed

EnterpriseWorks Worldwide's (formerly Appropriate Technology International) Global Livestock Producers Program (GLPP) will increase the productivity and efficiency of dairy and beef cattle in Tanzania and thereby mitigate ruminant methane emissions. The potential reduction of ruminant methane emissions and subsequent impact on greenhouse gas (GHG) reduction is encouraging. Domesticated ruminant animals such as cattle, buffalo, and goats are the second largest source of anthropogenic methane, annually contributing an estimated 20 to 25 percent of global methane production.

Food and Agriculture Organization (FAO) statistics indicate that the developing countries of the world contain more than half the world's cattle, yet account for less than 15 percent of the global meat/milk production. About 30 percent of global methane emissions from large ruminants comes from animals in these less developed regions, 85 percent of it is exhaled when the animals remasticate their feed in order to digest it.

There has been more than 50 years of scientific research conducted on ruminant methane at numerous universities and research stations around the world. The ability to measure and quantify ruminant methane emissions has been and will continue to be of interest because it indicates how efficiently an animal is utilizing the feed it consumes and ability to reach genetic potential.

Generally speaking, the level of methane production from the rumen is based on the quantity (energy value) and quality (digestibility) of the feed an animal consumes. Methane production is calculated as a percentage of the Digestible Energy (DE) consumed. In a feed ration that is highly digestible (greater than 70 percent Total Digestible Nutrients or TDN), it would be expected that 4 to 6 percent of the DE would be converted to methane. As the digestibility of a ration decreases, the percentage of DE converted to methane increases to a point as high as 15 percent (rations with a TDN less than 50 percent).

The genetic makeup and diets of cattle and buffalo in developing countries differ substantially from those of animals in developed countries. The genetic potential of cattle in developing countries is roughly twenty to thirty-five percent of developed country animals. This genetic constraint makes it difficult to significantly enhance milk and/or meat production as the demand for animal products increase with a country's economic development. Animals in developing countries are consequently less productive than animals in developed countries on a per animal and aggregate basis due to the much lower genetic potential and limited diet.

These relatively poor genetics lead to a higher methane output per unit of production. The United States Environmental Protection Agency (USEPA) estimates that various options - such as genetic improvement, as being proposed in this project, and changes in feed characteristics through supplementation can reduce developing country livestock methane emissions by 25 to 75 percent per unit of product, and thereby cut global methane emissions from ruminant livestock by up to 12 percent.

3.0 Methane Per Unit of Product

Increasing production per animal results in a decrease in the number of animals needed in a national herd to meet the demand for animal products, which in turn reduces the amount of methane given off by the national herd. This approach for measuring ruminant methane emissions on a per unit of product basis is the accepted methodology by the various international bodies and actively applied by the USEPA.

In developing countries, cattle generally have a low genetic potential for production as compared to cattle in more developed countries. Roughly, a *bos indicus* (non-European) breed of cattle will have the genetic potential to produce 1,000 to 3,000 liters of milk per lactation, whereas, the *bos taurus* (European or improved) animal has the potential to produce 8,000 liters of milk per lactation.

The genetic limitations of these animals combined with the feeds that are generally given results in a very high level of methane being produced per unit of product. The genetic potential of cattle in Tanzania combined with the low digestibility of the local feeding regimes greatly decreases rumen efficiency and productive output of the cattle.

The result of this low productivity per animal unit is the potential for increased bovine populations to meet the demand for animal products (milk, meat, draft power) demand, which would increase GHG emissions and further strain the natural resource base. As the human population of Tanzania increases¹ and the economy develops², a larger quantity of animal products will be required to keep pace with not only the larger numbers of people, but also a probable increase in demand per capita due to the country's presently expanding economic base. To meet this increased demand it will require an ever increasing number of animals and/or a more productive national herd. From a global perspective, expansion of the herd is seen as the less desirable option, as an increased number of animals would result in a greatly increased production of ruminant methane.

The logical solution therefore, would be to increase the per animal productivity of the national herd. This is the approach targeted by this potential AIJ project, under the rational that if the constraints to enhancing per animal productivity can be diminished, then a larger percentage of the animal product demand can be met by higher producing animals. In this manner, the project will help optimize the emissions of methane gas relative to the production of the end use product (milk and meat). This optimization will require fewer animals to meet the necessary productive output for the country, which in turn will decrease the amount of methane produced per unit of product and in total aggregate output. A decreased number of animals will also reduce grazing pressure on fragile lands, which will have an additional positive environmental impact.

4.0 Project Background

EnterpriseWorks has a long commitment to agricultural development in Tanzania through its livestock and edible oils and staple food crops programs. The GLPP has completed four project studies in Tanzania. The first being a pre-feasibility study for the USEPA entitled "Assessment of the Pre-Feasibility of Feed Supplementation as an Opportunity for Reducing Methane Emissions in Northern Tanzania."

The second and third studies were GLPP self-financed in December 1996 and October 1997 to look at the potential of improving the production and productivity of ruminant cattle in the Mwanza³ region of Tanzania. The second and third studies determined that there was great potential for a project that centers around the development of a commercial feedlot and/or ranch to produce genetically improved dairy and beef cattle for sale throughout Tanzania.

The fourth study was undertaken by the GLPP, with US Department of Energy and Rockefeller

¹ The population in Tanzania is currently growing at approximately two percent per annum. From the Food and Agriculture Organization database.

² Over the past ten years the economy of Tanzania has been growing at an average rate of 3.5 percent per annum. From the US State Department's Fiscal Year 1999 Commercial Guide for Tanzania

³ Mwanza town is located on the south shore of Lake Victoria in northwestern Tanzania.

Foundation financial support, in September-October 1998. The study built upon the second and third studies of the region and looked at specific site identification, marketing channels, feed supplies and equipment, and quantitative and qualitative livestock production information to develop an estimated ruminant methane emissions baseline and intervention reduction scenarios. Mark Orlic, from the USEPA, accompanied two GLPP members on this fourth trip. Mr. Orlic was instrumental in helping explain the science and methodology behind ruminant methane monitoring and analysis to the GOT representatives from the Vice President's Office where the Ministry of Environment is housed and CEEST. Mr. Orlic also provided insights and suggestions to the team on moving this project forward as an AIJ initiative.

5.0 Project Description

The goal of this AIJ ruminant livestock project is to reduce ruminant methane emissions in Eastern Africa. [The proposed project plans to establish a sustainable cattle multiplication unit (CMU) at Mabuki Ranch in the Mwanza Region of Tanzania. This CMU will focus on raising genetically improved animals to be purchased by farmers, developmental organizations, and other CMUs in Tanzania.] Through the purchase of these animals farmers will raise their income generation potential and reduce ruminant methane emissions.⁴

5.1 Site

[Mabuki Ranch in the Mwanza Region of Tanzania is the preferred site for this project. Mabuki is located approximately 65 kilometers south of Mwanza town on the main road from Mwanza to Singida. The ranch is approximately 10,000 hectares in size with a river that bisects it from south to north. Mabuki Ranch is preferred to other sites looked at for the following reasons:

1. It has all available feed resources required for operation nearby or has the ability to grow them on farm.
2. It is located on a main road that is currently undergoing resurfacing. There is also rail, ferry and air service to Mwanza domestically and internationally.
3. The ranch is being privatized by the GOT through its privatization program so the ability to secure this land will be easier than other potential sites. Other potential sites would require a lengthy local, regional, and federal approval and land securing process; whereas, Mabuki Ranch will only require federal approval.
4. Electricity is already available at the site.
5. The site is located near Mwanza town which is a major trading center for Tanzania.⁵
6. The Mwanza Region has the highest cattle population in Tanzania.⁶

⁴ It is estimated that a small holder producer could at least double their net income returns from improved cattle.

⁵ Approximately 70 percent of all economic trade for Tanzania takes place in the Mwanza Region.

5.2 Implementation

[After securing Mabuki Ranch, once the project is fully funded, the GLPP plans to develop the site.] A partial listing of items needed are: new buildings, livestock handling equipment, water resource restoration, and fencing materials. The work conducted to date indicates that most of the necessary items can be purchased within Tanzania. The ability to obtain necessary infrastructure items gives the GLPP a very good level of comfort that a potential project can succeed, because it will be possible to have repairs and replacement parts available so as not to interrupt the production process. [One aspect of the project that will require importation are frozen cattle embryos. The GLPP has looked in-depth at the possibility of importing improved genetics by means of embryo transfer and the group is confident that this can happen with minimal costs and delays.]

The project will eventually make hundreds of improved animals available each year to small holder farmers throughout Tanzania. The project will start slowly in the initial years with the number of improved animals that it provides to allow project management enough time to properly establish the project. The objective to this cautious beginning is to ensure that the project will be sustainable. It is estimated that initially the project will be selling less than 200 improved animals per year but will ramp up to over 700 improved animals per year after five or six years.

5.3 Market

[A marketing study undertaken by the GLPP shows that there is a lack of good quality and affordable cattle in the region and Tanzania on the whole. [Mabuki Ranch is currently being operated as a CMU by the GOT so as to make available genetically improved animals to farmers in Tanzania. The Mabuki Ranch manager indicates that the region is void of quality cattle and the demand is high for improved cattle. Mabuki is currently able to satisfy less than 50 percent of the demand for improved cattle annually within the region. This assessment is also supported in conversations with the regional livestock officials, World Food Programme and Heifer Project International representatives⁷, and other livestock people in the region. In conversations with GOT officials their goal is try and preserve the CMU focus of Mabuki Ranch so the GLPP is confident that the potential project being proposed here will be viewed favorably by the GOT.]

6.0 GOT Developmental Objectives

⁶ The Mwanza Region cattle population in a 1993/94 Sample Census by the GOT Ministry of Agriculture was estimated at 2.45 million head, which ranks first in the country for total population. The Shinyanga Region, immediately to the south of the Mwanza Region, ranks second in cattle population at 2.26 million head.

⁷ The World Food Programme and Heifer Project International have been initiating projects in the Mwanza Region that provide animals to farmers on a loan basis with repayment based on in-kind animals.

Tanzania is one of the poorest countries in the world. The 1997 annual gross national product per capita figure for Tanzania was US\$210.⁸ The GOT has a stated goal of being at least self-sufficient in food production. Tanzania's objectives were set forth by the GOT in its Agricultural Policy of 1983. The objectives are to:

1. Provide sufficient food for a growing population.
2. Generate foreign exchange (agriculture is the prime source for exports for the country)
3. Supply domestic industries with raw materials.
4. Raise rural income levels and alleviate poverty.⁹

There should be a steady increase in milk and meat demand in the future due to the Tanzanian's rising purchasing power. The following table gives consumption figures of milk and meat for three developing countries (Tanzania, Kenya and Botswana)¹⁰.

Table 1: Consumption Patterns (1996)

Country	Milk Kg./Year	Beef Kg./Year	All Meats Kg./Year
Tanzania	21.87	6.54	9.45
Kenya	79.99	8.99	14.01
Botswana	126.94	13.55	28.68

Information for Table 1 from Food and Agriculture database

As compared to Kenya or Botswana, Tanzania would need a four to six fold increase in milk consumption and one-half to three fold increase in meat consumption to be at roughly the same nutritional standards. There has also been an active and supportive role by the GOT to attract companies to initiate projects that will improve the rural population economically. It is appropriate to expect that this proposed project will be accepted by the GOT.

7.0 Economy

Official Tanzanian statistics indicate that Tanzania's average economic growth for fiscal year 1997/98 was approximately 3.3 percent per annum.¹¹ During the last ten years, Tanzania has

⁸ World Bank Statistics

⁹ Tanzania Agriculture Sector Memorandum, Report No. 12294 TA, The World Bank, 1993, p. 173.

¹⁰ Kenya and Botswana are used to compare against Tanzania due to the relative stable political atmosphere and economic success that each of these African countries have gone through the past three decades.

¹¹ US State Department Fiscal Year 1999, Commercial Guide for Tanzania

experienced an average growth rate of 3.5 percent per year. Inflation dropped to 17 percent by June 1997 and throughout fiscal year 1997/98 inflation was fairly stable at 13 percent per annum. The GOT is aiming at reducing inflation to single digits.

During the first half of the fiscal year 1997/98, there was improvement in government revenue collection and a decline in government expenditure, thus narrowing the fiscal deficit. The GOT has made significant progress in opening the economy. The principal growth sectors for the next ten years will remain agriculture, industry, mining, and construction, as well as, trade, tourism, infrastructure and technology development.

Tanzania's economy continues to be dominated by agricultural production, although the rate of growth for the sector was only 3 percent in 1998, which accounted for approximately 54 percent of gross domestic production. Agricultural output remains predominantly based on small holder production.

The monetary and financial sector changes have created a fairly good macroeconomic framework for private sector development. The GOT has set out to reverse the socialist policies to reduce government interference in the economy that should continue to stimulate economic growth. The GOT is providing incentives to outside investors wishing to invest substantial amounts of capital in Tanzania. In 1990, the GOT created the Investment Promotion Center to promote international investment in Tanzania, especially in the primary sectors like agriculture.

8.0 Ruminant Production Systems

The large ruminant population, which consists strictly of cattle, can be characterized in three segments when one looks at methane production on a per product basis: milk, beef; and draft power. The cattle industry in Tanzania is still at a low level of sophistication and will need to intensify if it is to get to a self sufficiency level. This intensification is possible for the majority of cattle since only a fraction of the animals are under traditional pastoralist's systems.

Overall milk production has been increasing approximately 2.5 percent per annum; however, a large portion of this increase is due to cattle population growth. The dairy sector is gradually intensifying its production system, which is ideal for genetically improved cattle. The beef and draft sectors are almost exclusively raised under the extensive system.

8.1 Milk Production

The average annual production level per cow is approximately 400 kilograms for the indigenous cattle and 1600 kilograms for the improved cattle.¹² The native cattle currently produce the vast majority of milk due to their sheer number as compared to improved dairy cattle. Indications are

¹² Tanzania Ministry of Agriculture 1993/94 Industry Review of Ruminant Livestock.

that the improved herd will gradually constitute a greater percentage of the milk production, but without a continuous source of improved cattle this percentage increase will be slow.¹³

8.2 Beef Production

The beef cattle population, which is almost exclusively made up of native breeds is strictly raised on extensive production practices. The approximate mature weight of the beef cattle at slaughter time is 200 - 225 kilograms. Beef cattle in Tanzania are generally four to five years old before being ready to slaughter. This growth rate compares to an optimal rate of 18 to 20 months.

8.3 Draft Cattle

Draft cattle in general makeup a very small portion of the total cattle population and could be grouped with the beef animals. There has been little scientific research conducted on draft animal systems and their contribution to ruminant methane production. Draft animal production and efficiency is expected to be impacted marginally by this potential project. This report does not try to estimate the methane reduction potential of draft animals, which keeps to the conservative nature of the estimated methane reduction potential.

8.4 Production Benefits

As noted previously, the genetic potential of the vast majority of the cattle in Tanzania is low. There is reason to believe that with improved cattle the production practices of the small holder farmer will improve. Heifer Project International and the World Food Programme's efforts show that, with a combined extension and improved animal genetics package, significant improvement can be made on the productivity of small holder cattle. The bottleneck to improved production on the small holder system is the lack of improved cattle. This conclusion was reached by the GLPP after extensive interviews with representatives of both organizations, government extension personnel, and a rapid rural appraisal conducted by the GLPP. The project that will be implemented through this initiative will support the outreach and training already being provided by the various organizations and government extension programs.

9.0 Methane Assessment

Since 1991, when the GLPP started working with ruminant methane, the science and methodology for estimating the effects of mitigation projects has continually evolved. As refinements to the methodology have been accepted by the larger scientific community, they have been incorporated into the GLPP's methane modeling. This continued refinement of

¹³ The quality of the data available at this time regarding cattle production characteristics is considered fair. The data used to estimate the methane emissions at this time is derived from a survey of "old" and "new" information and cross checking that with observations in the field. The GLPP considers the data which is used to derive the methane emissions in this paper to be a close approximation of reality based on the group's expertise in livestock production.

modeling capabilities has allowed the GLPP's projects to generally exceed the standards set for ruminant methane estimation. In improving the methodology used for estimating ruminant methane, the GLPP has worked closely with the USEPA, Office of Air and Radiation. Recently this USEPA office put the final touches on a very complete generic model for the estimating of methane from a given ruminant population. This model, called "The Livestock Analysis Model" or LAM is based on the Intergovernmental Panel on Climate Change approved methodology for estimating ruminant methane, and is being promoted by the agency as the standard that should be used by all countries and parties in the estimation of ruminant methane. It is very comprehensive, incorporating many of the concepts that the GLPP has developed over the years with the USEPA¹⁴.

The LAM runs on a standard spreadsheet program, and takes into account herd demographics, levels of productivity, production system variation, animal size and feed quality. As such, it is much more comprehensive than any of the earlier modeling that was available, and coupled with the GLPP's extensive experience with developing county livestock projects is an excellent tool for estimating project methane mitigation.

To calculate the methane mitigation effects of the project in Tanzania, the GLPP used the LAM in conjunction with the projections of the annual cattle sales broken down between production systems. In this manner, the effect of introducing improved genetics on the production potential of the Tanzanian national herd can be projected.

It should be noted that given the relative scarcity of production data from the countries, this assessment should be considered preliminary. To forecast the methane mitigation potential of the project to a finer degree will require a detailed COBS. Such a study will be incorporated into an actual project plan that will be presented to potential investors at an early stage so as to quickly verify the preliminary GHG assessment.¹⁵ This notwithstanding, the preliminary assessment range should prove to be fairly accurate.

10.0 Baseline Scenario

It is first necessary to forecast what the future scenario would be in the country without the project to show the effect of this project on the production of animal products and methane. The baseline calculation is arrived at by first estimating the amount of animal products required by the human population over the time period coupled with the performance efficiency of the national herd.

10.1 Forecast Animal Product Demand

¹⁴ The GLPP was involved in the beta testing phase of development for the LAM.

¹⁵ The estimated cost for conducting a detailed COBS is US\$180,000 and would take approximately one year to complete.

In estimating the amount of animal products that would be required by the Tanzanian populace between 2001 and 2030, it is necessary to first establish what will be the growth in that population, and what will be the per capita consumption of animal products. Based on official GOT projections and FAO data, the population of Tanzania will grow at a rate of about two percent for the foreseeable future. This would signify that by the year 2030 the country will contain more than 60 million people. To estimate how much meat and milk this population would require, the design team compared current per capita animal product consumption with what is nutritionally required and what neighboring countries consume.

For the purpose of keeping the estimate conservative, the project team assumed that in the next thirty years the per capita consumption would increase to only half the difference between the current level and that seen in neighboring Kenya. This assumption yields an annual milk consumption of 51 liters of milk and 11.7 kilograms of meat.

10.2 Animal Productivity

Under the baseline scenario, the increased demand for animal products will be met by an increase in the overall numbers of animals, offset slightly by marginal improvements in the efficiency of the present herd. Given the market forces at work in the Tanzanian animal products sector, there should be a natural migration to improved animal genetics during the next thirty years. To take this factor into account, the projections incorporate a shift of approximately 0.25 percent per year of the national herd to improved blood animals. [Preliminary calculations put the per unit methane output for the native cattle at 144.2 grams of methane produced for every liter of milk.]

11.0 Intervention Scenario

The intervention scenario is developed to show what effect an improved genetics and extension package will have on the Tanzanian herd, from a productivity as well as methane standpoint. It was assumed that the only changes from the baseline would be in the productivity of the herd and the methane efficiency of those animals. Therefore, the production targets, the amount of animal products required by the human population, remain the same.

11.1 Animal Productivity

As under the baseline assumptions, the intervention scenario incorporates a slight shift over time to more improved blood animals. For the purpose of this analysis, the percent shift was kept the same as the baseline scenario. In reality, the movement to exotic animals will probably be greater because other players will start to get involved once this project has shown how economic improvement can be made. The reason for this is that the individuals who currently sell improved stock to producers are more likely to upgrade the genetics of their animals as producers start to demand higher quality animals; however, in keeping with the conservative

nature of this assessment, the shift only attributed directly with sales of exotic animals from the project are used so no claim is made at this time by the project of additional reductions. [Preliminary calculations put the per unit methane output for the pure bred to 75 percent blood improved cattle and 50 to 25 percent blood improved cattle at 27.36 and 36.77 grams of methane produced for every liter of milk respectively.]

12.0 Methane Mitigated

The methane reduction benefits from this project will come from the gradual dissemination of improved animals in Tanzania and the resultant improvements in methane efficiencies. [It is estimated that the project will offset between 5 and 7 million tons of methane over the 30 year project life.] While these figures are preliminary, and will need to be verified by the COBS, they are expected to be conservative in calculation and point to the tremendous potential of the project to offset substantial amounts of methane. [Using the currently accepted Global Warming Potential of methane, the amount mitigated from this project is equivalent to 28 to 39 million tons of carbon.]

13.0 Methane Monitoring Component

The main objectives of the methane component of the project are to:

1. Maximize the probability that future project partners (investors and implementors) will receive the carbon offset benefits of the project.
2. Obtain exact ruminant methane emissions on the Tanzanian herd.
3. Expanded the scientific base for future ruminant methane emissions monitoring and verification in Tanzania and other countries.

14.0 Project's Graduated Approach

The potential project's work plan developed from this DOE funding involves a series of graduated steps; each step slightly more complex than the previous but also more significant in terms of the final objective.

14.1 Major Steps

The five steps in the process of obtaining full approval of the project's carbon offsetting benefits are: a memorandum of understanding with the GOT, approval of the project under the USIJI/AIJ framework, securing of full project funding for implementation, a detailed study of the carbon offset potential of the project, the establishment of a methane monitoring laboratory and trial protocol in Tanzania, and finally, recognition of the project as an initiative under the Clean Development Mechanism (CDM).

14.2 Memorandum of Understanding with the GOT/Local GHG Institution

To initiate work in establishing the accrual of greenhouse gas benefits, the project will initiate contact with the agency that has been charged by the GOT (CEEST — Centre for Energy, Environment, Science and Technology) to work on GHG issues for Tanzania.¹⁶ The MOU will outline what steps each organization will be required to complete to work any future project through the GOT administration for AIJ/CDM approval. The GLPP has been able to secure this MOU with CEEST, which shows that a future project as being outlined in this report has a great chance of success on the GHG front. A copy of the MOU is in the appendix. Additionally, the Air and Radiation group of the USEPA has pledged their support in helping make sure a future project is successful.

14.3 Approval as an AIJ Project

The GLPP of EnterpriseWorks Worldwide is submitting this final report/proposal for AIJ approval as outlined under the funding agreement with the USDOE.

14.4 Project Funding Secured

It is estimated that once AIJ approval for the project is secured it will take approximately 9 - 12 months to secure full project funding. [The total estimated cost of the potential project is US\$5.5 million.]

14.5 Carbon Offset Baseline Study (COBS)

A COBS, a detailed study of the long-term carbon implications of the project, will be completed as soon as project funding has been secured and the initial project implementation has started. This study will have three main sections; a comprehensive livestock survey, an in-depth assessment of the various livestock production systems, and a detailed analysis of present and future animal product needs. The data gathered from this work will be incorporated into a computer model which will project the demographic trends of the Tanzanian herd and the methane related implications of the project. It is estimated that this COBS will take one year to fully complete.

14.6 Methane Monitoring Laboratory

To set up the laboratory and initiate monitoring trials, the project will draw on the expertise gained by the GLPP in India, Zimbabwe, and other countries. In fact a great deal of the training of Tanzanian technicians will probably be handled by the GLPP staff and contractors operating the Zimbabwe facility. By leveraging the experience of the group, the project will maximize its potential to firmly establish a laboratory and feeding trials that meet or exceed international

¹⁶ CEEST has been the lead organization for developing Tanzania's national action plan, greenhouse gas inventory, and sending representation to international climate change events.

standards.

14.7 Approval as a Clean Development Mechanism (CDM)

With the establishment of the laboratory for methane monitoring, and strong assurances of long term commercial viability, the only remaining step in the process of accreditation will be to receive CDM approval. Since the details of the procedures required for this status are still being negotiated at the international level it is difficult to say precisely what this application will entail. As presently envisioned, the project will take the lead in developing the application, but will require backstopping from the investor. It will be critical for the investor to take an active part in presenting the application and negotiating for CDM status. Once the project has received CDM certification it will be considered a viable effort, accruing green house gas credits for its investors.

15.0 Long Term Monitoring

As with almost all GHG mitigation projects, the Tanzanian effort will last for quite a few years. Current projections put the life of the project activities at 30 years. The proposed project life indicates that some type of long term monitoring, over and above the initial trial work, will be required. At this point in time there are no guidelines for what will be required nor are there specific rules laid out regarding the maintenance of GHG reduction certification. With ruminant methane issues it seems reasonable that a long term monitoring protocol would call for testing every five to seven years with independent review. Whatever the final monitoring requirements are, the project will most likely be able to accommodate them as it will have an established presence in Tanzania, laboratory and trial capabilities, and an information network for field data collection. Given the uncertainties of the long term monitoring issues, this preliminary plan for AIJ approval does not incorporate any estimations of that nature. The GLPP is ready to take all necessary steps to insure the implementation of all long term monitoring once the project is fully funded.

16.0 Financials

This potential project shows great promise in the mitigation of ruminant methane, income generation for small holder farmers in Tanzania, and providing a source of affordable basic consumer products. [Based on the estimated cost of the project and the estimated methane reduction potential the cost per carbon ton for the project is US\$0.16.]

17.0 Implementing Organization Overview

Enterprise Works Worldwide has gained experience in over 350 projects and activities in more than 40 countries promoting economic development, over the past twenty years. Working in a targeted number of economic subsectors, Enterprise Works has aided small-producers at all levels of the value chain, from production to consumption. Enterprise Works carries out its

responsibilities from a home office in Washington D.C. and has ten field offices located throughout the world.

The only cross-regional program area at EnterpriseWorks, the GLPP is active in Asia, Africa, and Latin America, helping small-scale producers raise the productivity of their dairy and beef cattle, alpaca and other highland animals, sheep, goats, water buffalo, and poultry. The GLPP is staffed by agricultural productionists and business and financial experts who know livestock, agribusiness, and economic development. Drawing also on the expertise of EnterpriseWorks personnel in other areas, the GLPP team offers comprehensive business development and production services in the livestock area.

The GLPP is the world's leader in establishing self-sustaining enterprises which supply cost-effective technologies and reduce ruminant methane emissions, in a number of developing world nations. The GLPP, with appropriate financial backing, looks to one day having a developmental impact on approximately five percent of the world's cattle producers, which could reduce methane emission by over 20 million carbon tons annually. The GLPP currently has cattle projects in India, Bangladesh, Nepal and Zimbabwe, and projects in development in Uganda, Tanzania and Brazil to name a few, which will increase ruminant animal productivity and reduce methane emissions on a per unit of product basis. These projects also incorporate a "state of the art" methane monitoring system.

The GLPP has worked closely with Washington State University (WSU) the past three years in taking the new SF₆ ruminant methane monitoring technology and methodology that was developed by WSU, with USEPA backing, to developing countries. The GLPP, with technical support from WSU, was able to establish the first two SF₆ ruminant methane laboratories in developing countries (one each in India and Zimbabwe). This new technology allows methane emissions to be collected in a natural setting rather than in an artificial setting that used expensive climate chambers. The GLPP has been able to collect and analyze ruminant methane data for the first time ever on cattle in Asia or Africa over the past two years. This information, along with more than 50 years of ruminant methane work in the US, is continually enhancing the GLPP's expertise in ruminant methane mitigation.

EnterpriseWorks/GLPP has lent its expertise in ruminant methane mitigation to various projects sponsored by the U.S. Environmental Protection Agency, ICF Incorporated, U.S. Department of Energy, and the U.S. Country Studies Program. EnterpriseWorks/GLPP personnel were also involved as accredited observers with the U.S. delegation to the Rio Earth Summit, the Berlin Conference of the Parties, and other international climate change conferences. The GLPP has also initiated ruminant methane/greenhouse gas workshops for developing country climate change and agricultural personnel in Southern and Eastern Africa.