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Institute of Forest and Wildlife Research and Development

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APFNet

Community Based Enterprise Development Plan for Damrey Chak Thlork, Kampong Speu Province

Submitted by

EDI

Enterprise Development Institute

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Table of Contents

List of Abbreviation

APFNet	Asia-Pacific Network for Sustainable Forest Management and Rehabilitation
AC	Agricultural Cooperative
Biz	Business
BGD	Biogas Digester
CF	Community Forestry
CP	A name of Company originally from Thailand
CFMP	Community Forestry Management Plan
CBA	Cost and Benefit Analysis
CEDAC	Center for Study and Development in Agriculture
DACP	Department of Agricultural Cooperative Promotion
EDI	Enterprise Development Institute
FA	Forest Administration
FAC	Forest Administration Cantonment
HHs	Households
H	High
ha or HA	Hectare
IRD	Institute of Forest and Wildlife Research and Development
IRR	Internal Rate of Return
ICED	Integrated Conservation and Enterprise Development
KHR	Khmer Riels
KTS	Name of a Company in Thailand
LWD	Life with Dignity
L	Low
MAFF	Ministry of Agriculture, Forestry and Fisheries
M	Medium
M&E	Monitoring & Evaluation
NTFPs	Non-Timber Forest Products
NTFP-EP	Non-Timber Forest Products- Exchange Program
NGOs	Non-Government Organizations
NPV	Net Present Value
NBP	National Biodigester Program
PRA	Participatory Rural Appraisal
PUAC	Peri-Urban Agriculture Cooperative
PDA	Provincial Department of Agriculture
RECOFTC	Regional Community Forestry Training Center for Asia and the Pacific
RAC	Rattan Association of Cambodia
SFM	Sustainable Forest Management
SME	Small and Medium Enterprise
USAID	U.S Agency for International Development
USD	U.S Dollar

1. Background

Damrey Chak Thlork Community Forestry (CF) is situated in Kraing Deivay Commune, Phnom Sruoch District, Kampong Speu Province. This CF has been officially registered and gained agreement with the Forest Administration Cantonment (FAC) in 23 June 2014 for a period of 15 years, from January 2016 to January 2030 with the possibility to extend for another 15 years. This CF consists of two main villages, Dak Por and Kraing Kor, that hasa total of 388 households[1] (with 1753 persons) and has been registered officially to take ownership of a community forestry area, equal to 1452 ha and was actively implementing numbers of initiatives in the past. Under its current Community Forestry Management Plan (CFMP) has been divided CF forestry land into 5 areas: (i) Chamkar Thun 146 ha, (ii) Damrey Chak Thlork 323 ha, (iii) Trapaing Pring 528 ha, (iv) Chrush Kes 409 ha and (v) Pech Sangva 46 ha.

The Institute of Forest and Wildlife Research and Development (IRD) under specific support from APFNet started to implement projects supporting Sustainable Management of Forests in Prek Thnot Watersheds in early 2015. These projects have also been contributing and supporting a number of local communities in the watershed area, including Damrey Chak Thlork to have gained an improved livelihoods condition through developing community-based enterprise and by using an integrated conservation and development approach. The general objectives of the project being carried out by IRD/APFNet are: (i) To build capacity and raise awareness on the concept of integrated watershed/landscape planning for central and local stakeholders through scientific assessments, analysis and participatory watershed/landscape planning processes, (ii)To improve the integrated management of Prek Thnot Watershed with participation of stake holders, and (iii) To share the experiences and lessons' learned from the project to stakeholders.

In early July 2016, IRD contacted Enterprise Development Institute (EDI) to carry out Participatory Rural Appraisal which has led to the development of the Community-Based Enterprise in Damrey Chak Thlork CF. This document describes what can be done for, and run by, the community members themselves for business/ enterprise planning under the coordination/ facilitation of EDI.

2. Problems Statement and CF's Development Context

Sustainable livelihoods is still a key question for all rural and community development in Cambodia in general. Kraing Deivay commune has about 10% of households living in the category of Poor 1 and Poor 2 condition. Food production, food security and food consumption has been given highest priority by the government of all times of its National Strategic Development Plan (NSDP) mandate. Damrey Chak Thlork CF consists of two main villages, Dak Por and Kraing Kor, in which there are 13% of families under ID Poor1 and Poor2 together and only 39% of all households have access to latrines and basic sanitation. In the dry season, they have challenging issues in terms of access to water for domestic and animal use. Studies reveal that only 5% have access to a water pump, 9% to open well and 27% have access to water from a public pond. Local communities have tried to harvest rain water during rainy season for domestic use and for fruit and vegetable production.

[1] Data given by Commune Chief in July 2016

Access to productive agricultural land and assets; it is revealed that local communities in Damrey Chak Thlork area have access to land for housing and agriculture activities with an average 1.7 ha per household, rainfed rice land of 1.37 ha, chamkar rice land 1.73 ha and forest land 1.67 ha respectively (EDI's PRA report, Aug 2016). More importantly, it is also noted that people have limited access to electricity and other assets for their day-to-day lives.

There are several sources of livelihoods for household incomes including irrigated rice, rainfed rice, vegetable production, other orchard land and especially from other NTFPs collection such as mushroom, bamboo and bamboo shoots, plus firewood for cooking. Their livelihood calendar is almost all year round from January to December, showing different kinds of livelihood activities, which indicated that people are working hard to develop their livelihoods.

Key constraints or problems identified during this enterprise development initiative have included the limited capacity of CF Committee and household members to apply modern agricultural techniques, to adopt and use new technologies and their lack of entrepreneurship skills. Although most of the farmer community is labor intensive and hard-working people, they lack financial and business management skills. They also lack a wider connection to provincial and national market places for their agricultural commodities. Therefore they do not have much bargaining power for trade activities with middlemen and lose advantages of gaining better incomes from their efforts. .

Forest and NTFPs resources are rich compared to other communities, but they lack a strong business mindset and planning for extraction and processing to make their final products tradable with high value in the market chain. All community respondents during this assessment had reported that its members can access the forest freely to collect different kinds of NTFPs such as wild honey, bamboo and bamboo shoots, rattan and vines, mushrooms, fuel wood, red ants and traditional medicines from the CF site. Some NTFPs are available seasonally and the majority of its CF members have access to grasslands for cattle feed all year round.

Lessons learned from past experiences regarding implementing red ants and charcoal production should be a lesson learned when moving forward with this community enterprise development plan; especially in providing technical and financial support. There is also need to address the management capacity, the commitment of individual CF members to join in business/ enterprise development plans and on-going support through business coaching/mentoring approach.

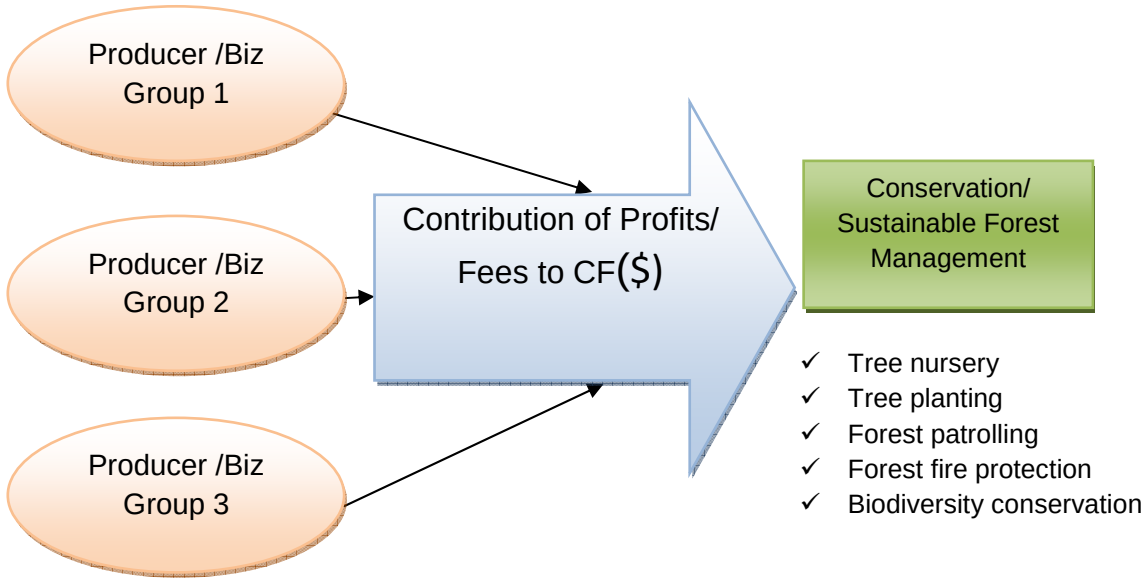
New trends of agri-business development in that CF area have been implemented since early 1999 and now large companies such as Grandis, Phnom Penh Sugar Companies and other private companies are targeting this area for expanding their agri-product development such as teak, rubber, sugar cane, cassava, mango and date palm plantation. Local community members have not only an opportunity to be on-farm employees but also the corporate partners for contracted farming with those companies if they have land available for cash crops.

3. The Enterprise Development Framework for this community forestry

IRD is considering an Integrated Conservation and Enterprise Development (ICED) approach for achieving both conservation and socio-economic development of the local communities living in the target area by working in close partnership with NGOs and Local Government. IRD will work in close

collaboration with private sector and institutions who can work effectively in supporting the community enterprise of Damrey Chak Thlork CF; this will aim to follow conservation of forest ecosystems, preserving indigenous tree species and wild plants in the CF site. This ICED approach will become a supportive tool in the long run to help local communities, local government and other stakeholders to achieve sustainable development goals in Cambodia. It is imperative that communities become self-sufficient and self-sustainable to wean them off charity handouts from NGOs. They should be given the skills and the mindset they can build their own disaster resistant communities and maintain constant food security.

This enterprise framework will involve Silvopasture (raising cattle), integrating it with other high value cash crops that are in high market demand, and introduce innovative technology to support energy consumption and produce natural fertilizers for it CF members in the villages. The framework below shows the flow of producer groups/ business groups to make profits and to be able to contribute to conservation efforts as the end result of it business activities.



This overall framework highlights the way that IRD addresses problems/issues related to food insecurity, poverty and weak natural resources management through a number of development approaches, alternative livelihoods, innovative technology and community forest enterprise. IRD will assist CF Committee to form Business Groups or Producer Groups (as a sub-committee).Under the current structure of CF Management Committee, they will perform different sectors of the business such as cattle raising group, rice producer group, fruit and vegetables, and a credit group. They will also get capacity building/ training related to those businesses and sub-sectors and sub-sector value chains, provide innovative and technologies transfers in order to make sustainable incomes and strong ownership at the community level.

As there were strongly recommended business sectors for Damrey Chak Thlork CF (re PRA results), the cattle raising business will become the dominating sub-sector during this short-term period in line with the committed APFNet support program (from January 2015 to December 2017). But the

implementation of the community based business/ enterprise project relies on the communities' actual capacity, their commitment and what resources are available.

4. Strategic Action forcommunity based enterprise in CF area

4.1. Goal and Specific Objectives

The overall goal for this community based enterprise development plan is" ***to enhance communities' economic growth through agricultural production and Silvopasture practice in achieving forest conservation in Damrey Chak Thlork CF***".

Specific objectives are:

1. To promote new business/enterprise concepts for the CF members through capacity development/ training on cattle raising and other integrated development approach in that CF area.
2. To develop community forestry enterprises through other alternative cash crop production where it can respond to unmet market demands internally and externally.
3. To facilitate multi-stakeholders efforts and building networks and partnership for achieving forest conservation, development and governance in this CF area.

4.2. Expected Outcomes and Indicators

It is expected that the community based business/enterprise development will be successful based on key outcomes and indicators as following:

4.1.1. The business model (Silvopasture) will enable the increase of income potential and profit margin for CF Committee, sub-committee and at producer or household level.

4.1.2. Capacity and skill in agricultural techniques in relation to cattle-raising, other cash crops and processing, packaging and marketing will be increased and they will have confidence to supply consumers and other services to CF members.

4.1.3. The increased numbers of cows as direct results from the cattle raising business, cash crop growing, profit margin and CF members will create more investment opportunities by themselves after the project intervention has been completed.

4.1.4. Other stakeholders and donors are more interested in supporting CF members in this area as a result of better forest conservation and improved social welfare which has a positive impact from community business/ enterprise.

4.1.5. CF Management Committee has greater ability and is more confident in managing CF sites, serving its members at household level with more transparency and accountability.

4.3. Area of focus for business/ enterprise work in this local area

This enterprise development plan will aim for both short-term (between1-3) and medium to long term (4-10 years) results. The initial start-up will begin soon, in Sep/Oct of 2016to address immediate needs: building infrastructure, fences and cattle house/ pen before getting cattle, forming producer group, before giving training/skills, and applying those technical skills. Pond and water harvesting and storing materials will also be needed at the beginning stage.

4.3.1. Silvopasture business:

Silvopasture can be best applied in Damrey Chak Thlork CF, where local communities have been practicing traditionally in the CF area for many years. This type of business will combine forestry and grazing of domestic animals in a mutually beneficial way. Advantages of a properly managed Silvopasture operation are enhanced soil protection and increased long-term income due to the simultaneous production of trees and grasses for animals and other products from farming. A cattle raising business is strongly proposed for this area because of the willingness and commitment of CF Committee and household members to make it work, and the positive experiences of other nearby CF who do this business successfully. Damrey Chak Thlork CF members can also learn from those communities and their success. Economic benefits of cattle raising and the production of other high value cash crops are in the section (4.5) below.

4.3.2. Agricultural Innovative:

There is also an option provided for agricultural innovative. A range of activities proposed for farmers, entrepreneurs includes improved agricultural techniques, using high quality seeds, natural fertilizers, and other inputs supplies in order to improve production, especially those agricultural products that meet market demands. This practice can be addressed at the farmer's household level. Water and soil management will also be focused on, as this is vitally important for the production of healthy crops and is often overlooked or completely ignored, with disastrous effect. All farmers/communities in Damrey Chak Thlork area suggested (as high priority) date palms, seedless lemons, lemon grass, sweet bamboo, and cashew nut as part of the cash crop production to be planted either in the CF site or at the household.

Promoting water resources management/ access to water for cash crops and vegetable growing is essential, especially for those villages/ areas that do not have water during the dry season. It could be possible to build reservoirs to harvest water or to dig ponds in the CF area. Drip Irrigation Systems (DIS) would be also introduced, coupled with fertilizing and pest control system technology.

4.3.3. NTFPs processing innovative:

A range of activities proposed for integrating includes improving technique for collecting Red Ants and packaging; wild mushrooms, vines and wild fruits should be introduced. Those resources are available from the CF site. Additional skills and trainings on related topics should be considered and designed for those producer groups as part of sustainable harvesting and conservation concept. Seasonal livelihoods calendars have indicated the different NTFPs products available from each season (see PRA report). There was room for improvement of the Red Ants and Charcoal production businesses that are already exist in the CF site, especially to improve their entrepreneurial skills.

4.3.4. Agriculture Cooperative:

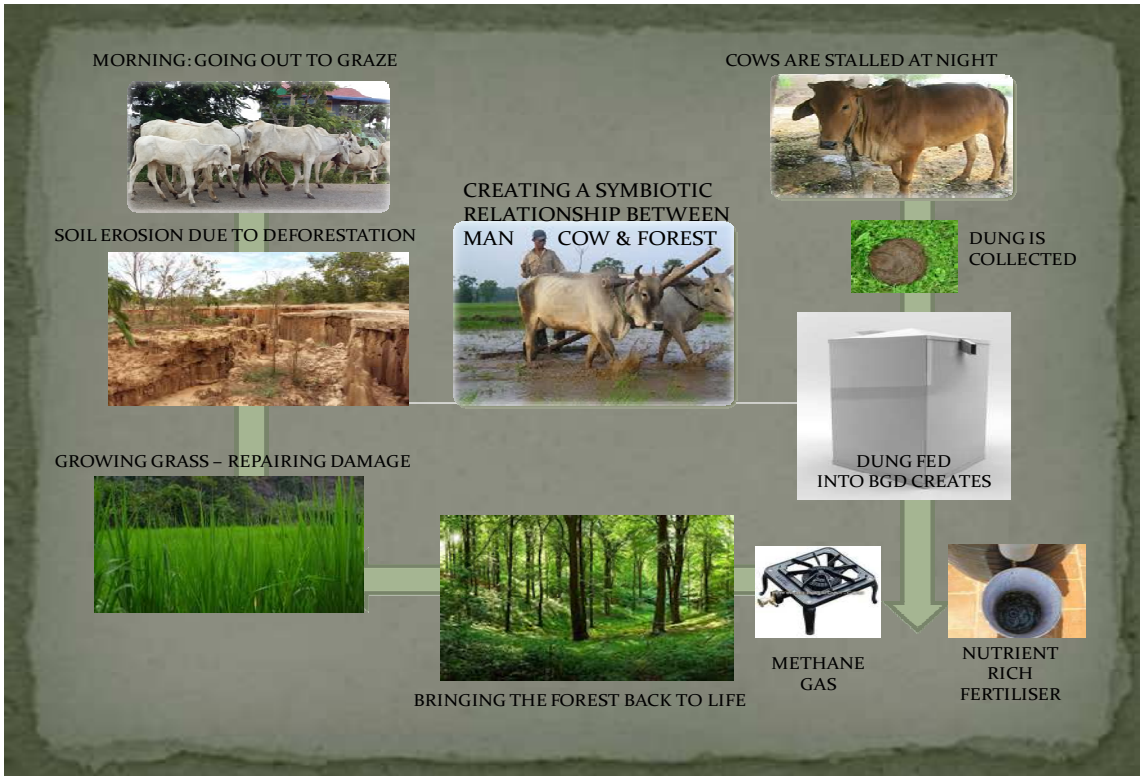
Agricultural Cooperative (AC) has been well-known and established across Cambodia since late 2001. It is now operated under the newly established Department of Agricultural Cooperative Promotion

(DACP) within the Ministry of Agriculture, Forestry and Fisheries (MAFF). There are two main types of AC to apply for and to get a license from MAFF: they are (1) The Supply Businesses that AC's can run their business on supplying everything it needs to its Cooperative members including agricultural seeds, fertilizers, materials, fuel etc., and (2) The Service Business that can offer a number of services to its members such as credit and savings, businesses and agricultural skills with fairly charge-fees and delivery of other services. The best performance of all AC's in Cambodia to date is on credit/saving program because it can generate incomes from loan services between 1.5 to 3 percent per month.

Damrey Chak Thlork CF has this kind of business potential because all households/ farmers are trading on this sector already. It was learned that AC had been established by LWD in the commune level but was not very active in the village level, especially in Damrey Chak Thlork CF area. If this model is to be developed, then CF Committee can restructure its roles in providing services, supplying agricultural materials and purchasing agricultural products from its members to the market places. This model of AC development needs specific attention and long term commitment to build strong business mindset from being pure farmers to be farming entrepreneurs.

4.4. Business Model applicable in Damrey Chak Thlork CF

4.4.1. Option 1: Silvopasture/Integrated Development Approach



4.4.1.1. Cattle raising business/enterprise concept:

It was noted during our visit to Damrey Chak Thlork that poor forestry practices have led to large-scale deforestation, which in turn has led to progressive large-scale soil erosion. It is imperative that this soil erosion is stopped immediately and the forest repaired back to its natural state. Regarding cattle-raising

inside CF site; there may be some pressure to forest and land resources there, its impact is less than people logging down indigenous trees or clearing land for large scale agro-industrial crops as has been happening with many Economic Land Concessions (ELCs) sites in Cambodia. By using Silvopasture, methods can be developed to have a more symbiotic relationship between farmers, cow and forest.

If the cattle raising business proves to be successful, it will also be linked to the development of technology of Biogas Digesters (BGD); then farmers can get energy for cooking and lighting from cow dung and also create organic manure. This technology has been used successfully in the past in rural Cambodia and it is proposed here as an integrated part of a silvopasture system. The National Biodigester Program (NBP)[2] has successfully fitted 25,000 across Cambodia to date and they are well received by the farming communities including those families in Kraing Deivay commune. A BGD takes in all biomass, including cow dung, and converts it to nutrient rich humus and methane, used for cooking and lighting, which in turn stops deforestation for fuel wood. Our technical consultant has developed a radically new type of BGD that is able to be built to scale up to meet the huge demand from farmers for this product. Using a BGD creates a symbiotic relationship with nature, the cows give us dung, which we use to grow grass or other vegetables including rice, which the cows eat it, and biogas (methane) plays a vital part in conserving the forest by not chopping down trees for fuelwood.

The raising of cattle in the CF area/site and reforestation should work hand in hand. Laying a variety of grass in the deforested areas will help to bind the soil together again. Cows walking through the area will help to flatten out any eroded areas. Initially, an agricultural tool could be used to turn and flatten out the eroded areas prior to laying grass seeds. The cow dung will give nutrients to feed the grass.

When the cows are stalled at night, dung can be collected for the BGD which will produce methane for cooking and also natural fertilizer to supplement the soil for vegetable and other cash crops. If there are funds available it would be prudent to lay tons of earth, tree cropping and any biomass prior to laying down the grass seeds. The layer of earth should be about 25mm deep. A mix of seeds should be chosen – some with a deep rooting system – some with high nutritional value – and some with high growth content such as king grass or elephant grass. This CF site is a perfect place to plant sweet bamboo for bamboo shoot production and leucaena trees (Leucaenaleucocephala) for fodder and other agro-industrial purposes. However, sweet bamboo can be grown here to prevent soil erosion better than other grasses, as it lays down horizontal rhizomes which bind the soil together which prevents break up of the soil and substructure.

The selected crops that can be considered to plant or grow in the CF site and at the household level include:

Cash crops suitable for CF site	Profitability (L-M-H)	Condition
1. Date palm	High*	Needs little water and this crop can be adopted to the CF soil condition
2. Giant King Grass/ Elephant grass	High*	Need less water and is adaptable to climate and type of soil in this CF area
3. Seedless Lemons	Medium to High*	Needs water and is adaptable to climate in this CF area
4. Sweet Bamboo	Medium to High*	Needs less water and is adaptable to climate and type of soil in this CF area
5. Mango	Medium to High	Needs less water and is adaptable to climate and type of soil in this CF area

[2] see the link website here at http://nbp.org.kh/

6. Cassava	Low to Medium	Needs less water and is adaptable to climate and type of soil in this CF area
7. Lemon grass	Low to Medium*	Needs more water during dry season but it is easy to grow in CF site
8. Leucaena	Low to Medium*	Needs less water and is adaptable to climate and type of soil in this CF area
9. Cashew Nut	Medium to High	Needs less water and is adaptable to climate and type of soil in this CF area

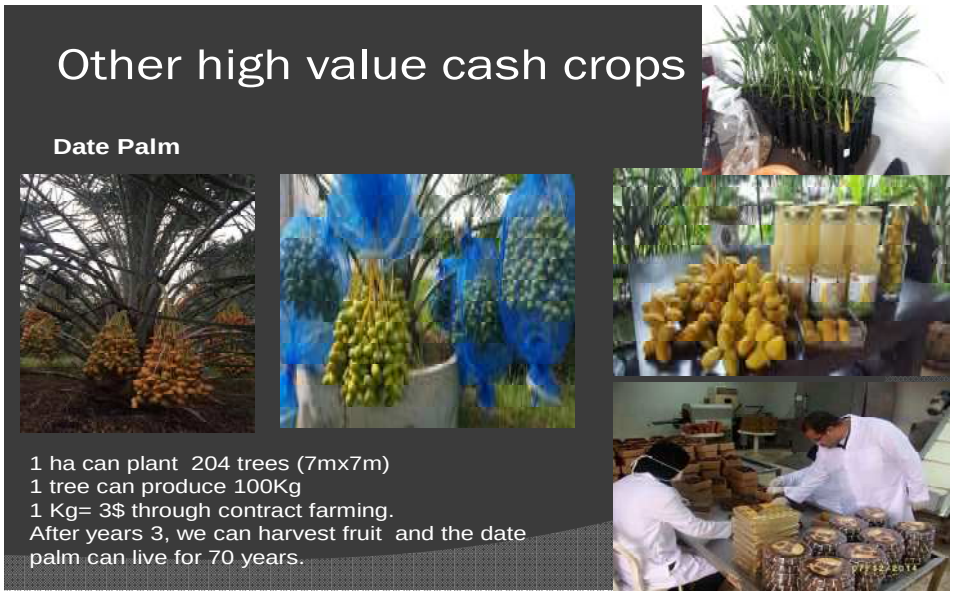
Note: (*) is the cash crops that are highly recommended possibly to grow inside CF site.

The main reason for recommending these crops is because some are already planted / grown by local community at the household level and some are newly introduced, and those are in high market demand. Further study on each of these cash crops and the suitability to the local area is needed because these relate to high cost of investment.

For the cattle raising business, it is recommended that site selection for cow foraging, houses, digging ponds and other discussions with CF Committee and its members is needed prior to makinga final decision on the investment costs, the responsibilities, the contributions and profit sharing.

Selected high value cash crops for consideration to integrate them into the CF site are:

1. **Date Palm (ឃ្មឹ):** is a tree species "Phoenix Dactylifera"[3], commonly known as date or date palm, is a flowering plant species in the palm family, Arecaceae, cultivated for its edible sweet fruit. Although its place of origin is unknown, it probably originated from lands around Iraq. This fruit is the most preferred of all Muslims in the world. In Cambodia, there are several companies including Oeung Sothy Group Co. Ltd will supply seeds, technology, and technical follow-up and do contract farming with farmer's groups or agri-entrepreneur groups. But they can contract to buy only 3$/Kg even though the current market price is set between 15$ to 25$/kg. See Cost and Benefits Analysis in section 4.5.



[3] Cited from Wikipedia: https://en.wikipedia.org/wiki/Date_palm

1. **<u>Seedless Lemon:</u>**The lemon plant is well-known in Cambodia, but the high-value seedless lemon is being introduced by numbers of local and international companies including KTS in Battambang, Cam-Agriculture, and other small companies. One of the lemon species that is good to soil and climate condition in Cambodia, which is similar to Thailand, is the Tahiti species. The Company in Cambodia is affiliated to a company supplier, trader and distributor in Thailand[4]. This lemon plant can plant 400-600 seedlings per hectare and can give fruits of 40 tons per hectare. The current price in Cambodia's market is fluctuating between 5000 KHR to 6000 KHR per kilogram. See Cost and Benefits Analysis for seedless lemon in section 4.5.

2. **<u>Sweet bamboo</u>:** Bamboo plants are a subfamily (Bambusoideae) of flowering perennial evergreen plants in the grass family Poaceae. Bamboos include some of the fastest-growing plants in the world due to a unique rhizome-dependent system. Certain species of bamboo can grow 91 cm (3 ft) within a 24-hour period, at a rate of almost 4 cm (1.5 in) an hour (a growth of around 1 mm every 90 seconds, or one inch every 40 minutes).Bamboo is of notable economic and cultural significance in Southeast Asia, being used for building materials, as a food source, and as a versatile raw product. Bamboo has a higher compressive strength than wood, brick, or concrete and a tensile strength that rivals steel. Farmers in Prey Nup (the closed to Damrey Chak Thlork CF) are practicing these cash crops and they could extend their services to other demands. See Cost and Benefits Analysis of sweet bamboo in section 4.5.

[4] Biggest fresh fruits company in Thailand that have business related as distributors, suppliers and can be found on facebook: https://www.facebook.com/KTS-Fresh-Intertrade-CoLtd-863909917029983/info/



2. **Giant King grass[5]/ elephant grass:** Giant King Grass is a fast growing, high yield, hybrid grass that is neither genetically modified nor invasive. It grows in a variety of soil conditions and does not compete with food crops. Giant King Grass is perennial and can be harvested several times per year.Giant King Grass is very fast growing. It is a short rotation crop that can be harvested in the first year, compared to other crops that have much lower yields, and cannot be harvested until their second, third or fourth year of growth. In Cambodia some Agriculture Cooperatives are planting this kind of grass for animal feeds and it has proven very successful. The yield of Giant King Grass in a tropical area with a 12 month growing season is 167 tons per acre (375 metric tons per hectare) of fresh grass at approximately 70-75% moisture.



3. **Leucaena:** this species is widely well known by the Cambodian farmers who plant it along household fences. It is a small, fast-growing mimosoid tree native to southern Mexico and northern Central America but is now naturalized throughout the tropical countries. This plant is not only used for cattle fodder but also for human consumption for a variety of Cambodian food items such as legumes. In Battambang, USAID supported SME Cambodia to plant this tree species in a number of hectares and they used leucaena for producing electricity in between 2004-07[6].

[5]http://www.viaspace.com/giant_king_grass_info.php
[6]http://docplayer.net/5488337-Small-and-medium-enterprise-cambodia-e-mail-smecambodia-sme-forum-org-kh.html

4.4.1.2. Cattle raising: applicable for the Damrey Chak Thlork CF

Based on PRA report in July 2016, the track record of households in Damrey Chak Thlork CF area has proven to provide good income from the current practices, related to cattle raising among other livestock. See the table 01 below of selected livestock that shows the total incomes of interviewed households and the sale per unit price in 2015.

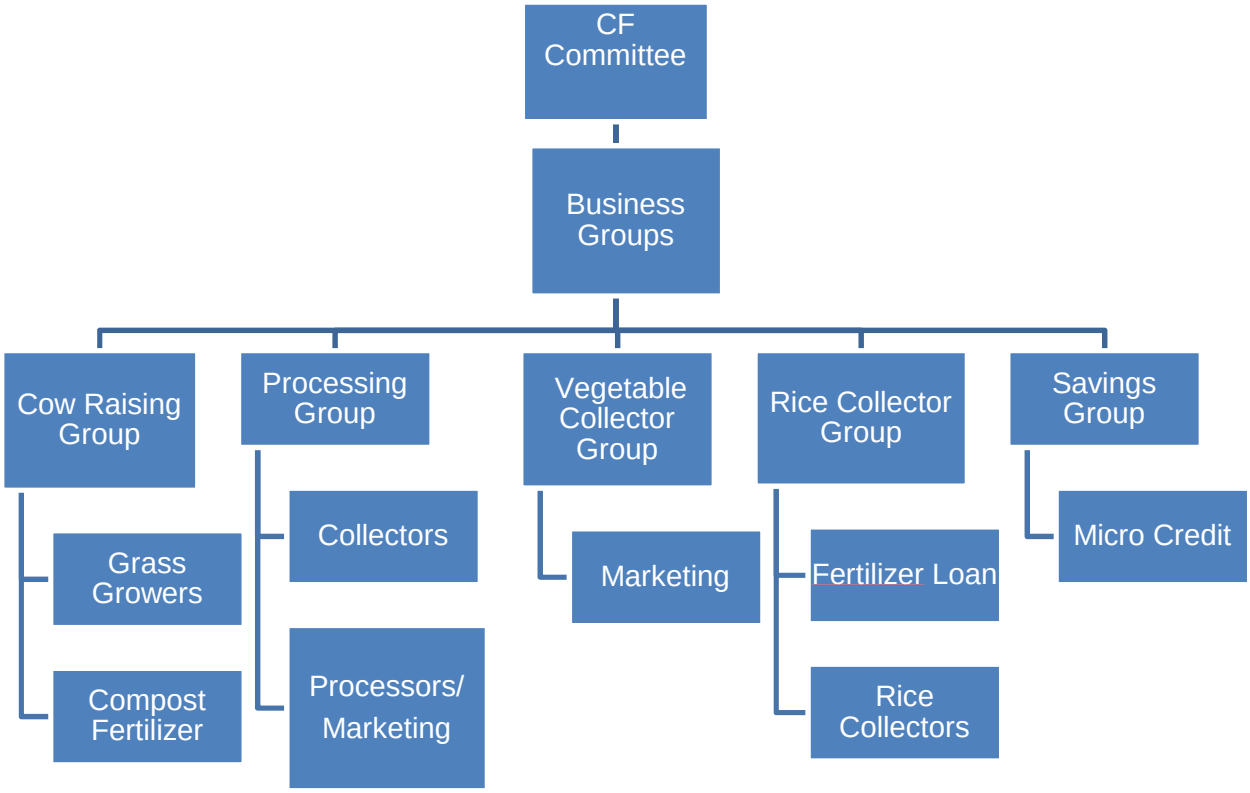
Table 01: incomes from livestock raising in Damrey Chak Thlork CF villages

Agri-products	HH	Total Sale	Unit	Expense (USD)	Income (USD)	Changes between Income and Expense	Sale Per Unit (USD)
Cattle	25	37	head	838	20,000	19,163	540.54
Pig	16	46	head	1,744	6,495	4,752	141.20
Chicken	28	370	head	151	1,506	1,354	4.07
Duck	6	28	head	20	150	130	5.36
Geese	2	13	head	-	113	113	8.65

Source: Results of PRA by EDI, Jul 2016

The table above indicates that 25 households reported they have sold 37 head of cattle with a total income of USD20,000 and they spent USD838 for raising the cattle.. They sold at an average of USD540.54/head. In total their income net is about USD19,163 not including labor costs. Cattle-raising represents the biggest income source among other livestock such as pigs, chickens, ducks and geese.

4.4.2. Option 2: Agricultural Cooperative Development Approach



Adopting from an existing Agricultural Cooperative model, the CF Committee can create different sub-committees or business groups to work on several business concepts such as a Cow Raising group (who are in charge of grass growing, compost/natural fertilizer making), Food Processing group (in charge of NTFP collection , processing and marketing), Vegetable group (vegetable growers and collectors, marketing), Rice collector group (in charge of fertilizer loan, collector and seller), Credit/Savings group (in charge of micro credit) that those are serving and supplying to all CF household members.

This business model 2 is aimed at reducing too much dependency on Community Forestry resources on the site, and this model will work directly with CF members at household level.

Further work is needed in order to create similar models to the existing structure of business; internal rules and regulations will be developed, business plans and other resources are needed prior to implementation. This structure will help CF in running smoothly with self-sustainable objectives for its incomes and operational costs if it has adequate time and financial resources to implement it and if it is properly managed.

If it is synergy between model 1 and 2:

Business models 1 and 2 complement each other very well, because if the cattle business is running successfully, the Cows Business group can make quality fertilizers to sell to its CF members and can also sell king grass to feed individual householders cattle as well as selling the seeds of grass. Sweet Bamboo plantation will help to generate bamboo shoots that can sell to food processing groups who need those products for other food processing purposes or for their own family consumption.

4.4.3. Current practices of the families in Damrey Chak Thlork CF

Based on PRA report (table 02) regarding incomes for household in Damrey Chak Thlork CF from the current practice, there are 09 selected crops: rice and cash crops that show the total incomes and sale per unit price for 2015. These crops are locally grown and soil condition is proven to be suitable for climate's condition.

Table 02: Incomes from agriculture and cash crops of interviewed households

No	Agri-products	HH	Total Sale	Unit	Expense (USD)	Income (USD)	Changes between Income and Expense	Sale per unit ($)
1	Irrigated rice	27	26,100	kg	4,278	6,890	2,612	0.26
2	Rainfed rice	19	18,700	kg	2,290	3,969	1,679	0.21
3	Vegetable	31	60	kg	12	54	42	0.90
4	Watermelon	3	50	kg	5	6	1	0.13
5	Mango	24	720	kg	215	143	-72	0.20
6	Papaya	12	20	Fruit	0	8	8	0.38
7	Jackfruit	12	220	Fruit	13	225	212	1.02
8	Banana	22	850	bunch	0	270	270	0.32
9	Cassava	4	5,100	kg	500	2,575	2,075	0.50

Source: Results of PRA by EDI, Jul 2016

From the table above it is indicated that rice is still a critical income source after producing for own consumption. 27 farmers earned net incomes from irrigated rice up to USD2,612 and another 19 households get income from rainfed rice of USD1,679 respectively in 2015. Cassava is also one of the biggest sources of incomes; 4 household planted cassava and they sold about 5,100 kg and the final net incomes was about USD2,075. The cassava was reportedly a good business last year but still have some challenges with fluctuating prices in the market.

4.5. Economic benefits for Agri-Products: Cattle and Selected Cash Crops

The following economic benefits analysis is only for some selected products that are suitable to do in the CF area. This community business/enterprise is also aimed at providing different choices for the household/ CF members while they will decide which type of products are likely to give them more profits than other sub-sectors.

4.5.1. Costs and Benefits Analysis for cattle raising business in Damrey Chak Thlork

It is imperative to consider a cattle raising business for this CF area. In Cambodia, generally farmers raise different kinds of cattle/cow species including Native Yellow cattle (the most common breed) while other major breeds are Haryana and Brahman. Most farmers in the study areas is (raising Native Yellow species) and kept their cattle under the house during the night, with or without mosquito nets.

Cattle are grazed in the field when there are no crops. Farmers also spend a lot of time cutting and carrying native grasses or crop residues to feed their cattle. Planting forage can help farmers to solve problems such as general feed shortages, dry season feed shortages, and freeing up labor for feeding animals. According to Heifer Cambodia and Oxfam, they conducted an assessment of business and market opportunity for self-help group/ agriculture cooperatives in April 2016; they have revealed two business models for cattle raising through costs and benefits: (A1) on improving forages for fattening beef cattle in 90 days and (A2) reproduction of cattle for fattening business model, and (A3) on combined cattle meat for sale and reproduction for calf purposes which is a traditional practice in the CF area (see table A1 to A3 below).

Based on these 3 business models, we can see Cost and Benefit Analysis (CBA), as shown in the following tables, in order to assist in decision making for investment:

Table A1: Cattle fattening in 90 days per cycle

Cattle Business (Fattening in 90 days)	Y1	Y2	Y3	Y4	Y5
Undiscounted Flows					
Costs for 3 cows	($1,638)	($895)	($895)	($895)	($895)
Benefits	3,105	3,105	3,105	3,105	3,105
Net Cash Flow	$1,467	$2,210	$2,210	$2,210	$2,210
Discount Factors					
Discount Rate	0.0525				
Base Year	2016				
Year Index	0	1	2	3	4
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149
Discounted Flows					
Costs for 3 cows	($1,638)	($850)	($808)	($768)	($729)
Benefits	3,105	2,950	2,803	2,663	2,530
Net Cash Flow	$1,467	$2,100	$1,995	$1,896	$1,801
Cumulative	$1,467	$3,567	$5,562	$7,457	$9,258
Net Present Value (NPV)	**$9,258**				
Internal Rate of Return (IRR)	**26%**				

Table A1 shows that the Net Present Value (NPV) for a 5 year projection is USD 9,258 with Internal Rate of Return (IRR) 26% and this is calculated with discount rate 5.25% according to Cambodia Central Bank, Dec 2007. The inputs include purchasing of 3 cows (with an average price of $500/head[7]). This business model shows that the farmer/ entrepreneur can do cattle fattening up to 4 cycles per year (with 90 days each). But this calculation is based for one cycle a year only. See total costs and returns in annex 7.1.1.

Generally, in Asia countries such as Cambodia, one benchmark is the fodder and grazing land for cows/ cattle. If a cow shed is on the same premises, minus that area, in a hectare, it supposes the grazing land or area where cows can roam and graze should be sufficient for anywhere between 50 to 60 cows, especially inside CF area. In Damrey Chak Thlork CF area grazing land is the biggest potential for all year round; this means that the farmer/ entrepreneur can keep up to 60 cows per hectare of land.

[7] Prices of cow sold in Damrey Chak Thlork area

Table A2: Cattle reproduction and fattening in 120 days per cycle

Cattle Business (Reproduction in 120 days)	Y1	Y2	Y3	Y4	Y5
Undiscounted Flows					
Costs for 3 cows (pregnant)	($4,785)	($207)	($207)	($207)	($207)
Benefits	3,012	3,012	3,012	3,012	3,012
Net Cash Flow	($1,773)	$2,805	$2,805	$2,805	$2,805
Discount Factors					
Discount Rate	0.0525				
Base Year	2016				
Year Index	0	1	2	3	4
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149
Discounted Flows					
Costs for 3 cows (pregnant)	($4,785)	($197)	($187)	($178)	($169)
Benefits	3,012	2,862	2,719	2,583	2,455
Net Cash Flow	($1,773)	$2,665	$2,532	$2,406	$2,286
Cumulative	($1,773)	$892	$3,424	$5,830	$8,116
Net Present Value (NPV)	**$8,116**				
Internal Rate of Return (IRR)	**10%**				

Table A2 shows that the Net Present Value (NPV) for a 5 year projection is USD 8,116 with an Internal Rate of Return of10% and this is calculated with discount rate 5.25% according to Cambodia Central Bank, Dec 2007. The inputs include purchasing of 3 pregnant cows (which an average price $1500/head[8]). This business model shows that the farmer/ entrepreneur can do up to 3 cycles per year (with 120 days each).See total costs and returns in annex 7.1.2.

Table A3: Combined purposes for reproduction and meat for sale per hectare

Cattle Business (Reproduction and Meat for sale)	Y1	Y2	Y3	Y4	Y5
Undiscounted Flows					
Costs for 60 cows (50 female and 10 male)	($60,900)	($400)	($400)	($400)	($400)
Benefits	50	40,050	40,050	40,050	40,050
Net Cash Flow	($60,850)	$39,650	$39,650	$39,650	$39,650
Discount Factors					
Discount Rate	0.0525				
Base Year	2016				
Year Index	0	1	2	3	4
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149
Discounted Flows					
Costs for 60 cows (50 female and 10 male)	($60,900)	($380)	($361)	($343)	($326)
Benefits	50	38,052	36,154	34,351	32,637
Net Cash Flow	($60,850)	$37,672	$35,793	$34,008	$32,311
Cumulative	($60,850)	($23,178)	$12,615	$46,623	$78,934
Net Present Value (NPV)	**$78,934**				

[8] Prices of cow sold in Damrey Chak Thlork area

Internal Rate of Return (IRR)	4%

Table A3 shows that Net Present Value (NPV) for a 5 year projection is USD 78,934 with an Internal Rate of Return of 4% and this is calculated with discount rate 5.25% according to Cambodia Central Bank, Dec 2007. The inputs include purchasing of 60 cows, 50 female cows (with an average price of $1000/head[9]). This business model shows that farmer/ entrepreneur can benefit from yearly offspring and supposes that they can sell 40 cows each year from year 2. This model was considering cattle raising per hectare of land allocation, which is the most preferable condition of CF Committee and members in Damrey Chak Thlork area. See total costs and returns in annex 7.1.3.

4.5.2. Economic benefits for the selected cash crops suitable in Damrey Chak Thlork

The economic benefits of some selected cash crops in the below table is intended to give farmers or producer groups in Damrey Chak Thlork CF information for their own decision making for selecting other cash crops that affect their households incomes. However, the ideal enterprise project could work best unless the individual farmer or producer groups understand the market demand from outside the community. For example, date palm, seedless lemons, sweet bamboo, cashew nut and cassava are high value cash crops that are in high demand and there are numbers of private companies that want to deal with the farmer in the form of contract farming; those companies will come to assist farmers with technical aspects, supply seeds and fertilizers and even financial resources. See tables B1 to B6 below of the Cost and Benefit Analysis for selected Cash Crops production that are suitable for integration in the CF site. These cash crops are (date palm, seedless lemon, sweet bamboo, lemon grass, and cashew nut). However, before doing these business models, soil suitability study and allocation of plots within their current land or within the CF site needs to be done. Some species require more water than other crops and therefore access to a clean and reliable water source is very important and is highly recommended for these business sub-sectors. Based on Cost and Benefit Analysis (CBA) for some selective cash crops, figures are revealed as following tables (from B1 to B6), however details of cost inputs and returns could be available in Annex 7.2.1 to 7.2.6.

[9] Prices of cow sold in Damrey Chak Thlork area

B1: Date Palm production per hectare (with contract farming)

Date Palm Plantation (USD/Ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Undiscounted Flows	6390	890	940	940	940	140	140	140	140	140
Costs for Production	($6,390)	($890)	($940)	($940)	($940)	($140)	($140)	($140)	($140)	($140)
Benefits	-	-	6,000	12,000	24,000	18,000	24,000	18,000	24,000	18,000
Net Cash Flow	($6,390)	($890)	$5,060	$11,060	$23,060	$17,860	$23,860	$17,860	$23,860	$17,860
Discount Factors										
Discount Rate	0.0525									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149	0.7743	0.7356	0.6989	0.6641	0.6310
Discounted Flows										
Costs for Production	($6,390)	($846)	($849)	($806)	($766)	($108)	($103)	($98)	($93)	($88)
Benefits	-	-	5,416	10,292	19,558	13,937	17,655	12,581	15,938	11,357
Net Cash Flow	($6,390)	($846)	$4,568	$9,486	$18,792	$13,828	$17,552	$12,483	$15,845	$11,269
Cumulative	($6,390)	($7,236)	($2,668)	$6,818	$25,610	$39,439	$56,991	$69,474	$85,319	$96,588
Net Present Value (NPV)	**$96,588**									
Internal Rate of Return	**41%**									

Table B1 shows that Net Present Value (NPV) of date palm for a 10 year projection is USD 96,588 with an Internal Rate of Return of 41% and it is with regard to the contract farming model. The inputs include Land Preparation, Date Palm Seedlings, Fertilizers, Watering system/DIS, Weed maintenance (Herbicide), Fruit collectors and pumping motor. See total costs and returns in annex 7.2.1.

B2: Date Palm production per hectare (with current market price)

Date Palm Plantation (USD/Ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Undiscounted Flows	6390	890	940	940	940	140	140	140	140	140
Costs for Production	($6,390)	($890)	($940)	($940)	($940)	($140)	($140)	($140)	($140)	($140)
Benefits	-	-	30,000	60,000	96,000	90,000	96,000	90,000	96,000	90,000
Net Cash Flow	($6,390)	($890)	$29,060	$59,060	$95,060	$89,860	$95,860	$89,860	$95,860	$89,860
Discount Factors										
Discount Rate	0.0525									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149	0.7743	0.7356	0.6989	0.6641	0.6310
Discounted Flows										
Costs for Production	($6,390)	($846)	($849)	($806)	($766)	($108)	($103)	($98)	($93)	($88)
Benefits	-	-	27,082	51,462	78,232	69,684	70,622	62,905	63,752	56,786
Net Cash Flow	($6,390)	($846)	$26,233	$50,656	$77,466	$69,575	$70,519	$62,808	$63,659	$56,698
Cumulative	($6,390)	($7,236)	$18,998	$69,653	$147,119	$216,694	$287,213	$350,021	$413,680	$470,378
Net Present Value	**$470,378**									
Internal Rate of Return	**92%**									

Table B2 shows that Net Present Value (NPV) of date palm for a 10 year projection is USD 470,378 with an Internal Rate of Return (IRR) of 92% and it is with regard to the current market price of the date palm products. The same inputs supplies include Land Preparation, Date Palm Seedlings, Fertilizers, Watering system/DIS, Weed maintenance (Herbicide), Fruit collectors and pumping motor. See total costs and returns in annex 7.2.2.It is noted that date palm can live for 70 years so that this cash crop can produce long term incomes/profits for the entrepreneurs.

B3: Seedless Lemon production per hectare (with current market price)

Seedless Lemon Plantation (USD/Ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Undiscounted Flows										
Costs for Production	($3,633)	($280)	($280)	($280)	($280)	($280)	($280)	($280)	($280)	($280)
Benefits	15,000	30,000	48,000	48,000	48,000	48,000	48,000	24,000	24,000	24,000
Net Cash Flow	$11,367	$29,720	$47,720	$47,720	$47,720	$47,720	$47,720	$23,720	$23,720	$23,720
Discount Factors										
Discount Rate	0.0525									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149	0.7743	0.7356	0.6989	0.6641	0.6310
Discounted Flows										
Costs for Production	($3,633)	($266)	($253)	($240)	($228)	($217)	($206)	($196)	($186)	($177)
Benefits	15,000	28,504	43,331	41,169	39,116	37,165	35,311	16,775	15,938	15,143
Net Cash Flow	$11,367	$28,238	$43,078	$40,929	$38,888	$36,948	$35,105	$16,579	$15,752	$14,966
Cumulative	$11,367	$39,605	$82,683	$123,612	$162,500	$199,447	$234,552	$251,131	$266,884	$281,850
Net Present Value	**$281,850**									
Internal Rate of Return	**295%**									

Table B3 shows that the Net Present Value (NPV) of seedless lemon for a 10 year projection is USD 281,850 with Internal Rate of Return of 295% and it is with regard to the current market price of the seedless lemons. The input supplies for this plantation includes Land Preparation, Seedlings, Fertilizers, Watering system/DIS, Weed maintenance (Herbicide), Fruit collectors and pumping motor. See total costs and returns in annex 7.2.3. It is noted that seedless lemon can live up to7 years so that this cash crop can produce long term incomes/profits for the entrepreneurs.

B4: Sweet Bamboo production per hectare (with current market price)

Sweet Bamboo Plantation (USD/Ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Undiscounted Flows	4130	230	230	230	230	230	230	230	230	230
Costs for Production	($4,130)	($230)	($230)	($230)	($230)	($230)	($230)	($230)	($230)	($230)
Benefits	2,400	9,000	51,000	51,000	51,000	51,000	51,000	27,000	27,000	27,000
Net Cash Flow	($1,730)	$8,770	$50,770	$50,770	$50,770	$50,770	$50,770	$26,770	$26,770	$26,770
Discount Factors										
Discount Rate	0.0525									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149	0.7743	0.7356	0.6989	0.6641	0.6310
Discounted Flows										
Costs for Production	($4,130)	($219)	($208)	($197)	($187)	($178)	($169)	($161)	($153)	($145)
Benefits	2,400	8,551	46,039	43,743	41,561	39,488	37,518	18,872	17,930	17,036
Net Cash Flow	($1,730)	$8,333	$45,831	$43,545	$41,373	$39,309	$37,349	$18,711	$17,778	$16,891
Cumulative	($1,730)	$6,603	$52,434	$95,979	$137,352	$176,662	$214,010	$232,721	$250,499	$267,390
Net Present Value	**$267,390**									
Internal Rate of Return	**145%**									

Table B4 shows that the Net Present Value (NPV) of sweet bamboo for a 10 year projection is USD 267,390 with an Internal Rate of Return of 145% and it is with regard to the current market price of the sweet bamboo. The input supplies for this plantation includes Land Preparation, Seedlings, Fertilizers, Watering system/DIS, Weed maintenance (Herbicide), Bamboo shoot collectors and pumping motor. See total costs and returns in annex 7.2.4. It is noted that sweet bamboo can live more than 10 years so that this cash crop can produce long term incomes/profits for the entrepreneurs.

B5: Lemon Grass production per hectare (with current market price)

Lemon Grass (USD/Ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Undiscounted Flows										
Costs for Production	($1,920)	($420)	($420)	($420)	($420)	($420)	($420)	($420)	($420)	($420)
Benefits	3,800	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850	3,850
Net Cash Flow	$1,880	$3,430	$3,430	$3,430	$3,430	$3,430	$3,430	$3,430	$3,430	$3,430
Discount Factors										
Discount Rate	0.0525									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149	0.7743	0.7356	0.6989	0.6641	0.6310
Discounted Flows										
Costs for Production	($1,920)	($399)	($379)	($360)	($342)	($325)	($309)	($294)	($279)	($265)
Benefits	3,800	3,658	3,475	3,302	3,137	2,981	2,832	2,691	2,557	2,429
Net Cash Flow	$1,880	$3,259	$3,096	$2,942	$2,795	$2,656	$2,523	$2,397	$2,278	$2,164
Cumulative	$1,880	$5,139	$8,235	$11,177	$13,972	$16,628	$19,151	$21,549	$23,826	$25,991
Net Present Value	**$25,991**									
Internal Rate of Return	**56%**									

Table B5 shows that the Net Present Value (NPV) of the lemon grass for a 10 year projection is USD 25,991 with an Internal Rate of Return (IRR) of 56% and it is with regard to the current market price of lemon grass. The inputs supplies for this plantation is included Land Preparation, Seedlings, Fertilizers, Watering system/DIS, Weed maintenance (Herbicide),and Pumping motor. See total costs and returns in annex 7.2.5. It is noted that lemon grass can live more than 10 years so that this cash crop can produce long term incomes/profits for the entrepreneurs.

B6: Cashew Nut production per hectare (with current market price)

Cashew Nut (USD/Ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Undiscounted Flows										
Costs for Production	($2,163)	($345)	($345)	($345)	($345)	($345)	($345)	($345)	($345)	($345)
Benefits	-	-	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
Net Cash Flow	($2,163)	($345)	$4,155	$4,155	$4,155	$4,155	$4,155	$4,155	$4,155	$4,155
Discount Factors										
Discount Rate	0.0525									
Base Year	2016									
Year Index	0	1	2	3	4	5	6	7	8	9
Discount Factor	1.0000	0.9501	0.9027	0.8577	0.8149	0.7743	0.7356	0.6989	0.6641	0.6310
Discounted Flows										
Costs for Production	($2,163)	($328)	($311)	($296)	($281)	($267)	($254)	($241)	($229)	($218)
Benefits	-	-	4,062	3,860	3,667	3,484	3,310	3,145	2,988	2,839
Net Cash Flow	($2,163)	($328)	$3,751	$3,564	$3,386	$3,217	$3,057	$2,904	$2,759	$2,622
Cumulative	($2,163)	($2,491)	$1,260	$4,824	$8,210	$11,427	$14,483	$17,388	$20,147	$22,768
Net Present Value	**$22,768**									
Internal Rate of Return	**33%**									

Table B6 shows that the Net Present Value (NPV) of Cashew Nut for 10 years projection is USD 22,768 with an Internal Rate of Return of 33% and it is with regard to the current market price of the cashew nut. The inputs supplies for this plantation includes Land Preparation, Seedlings, Fertilizers, Watering system/DIS, Weed maintenance (Herbicide),and pumping motor. See total costs and returns in annex 7.2.6. It is noted that cashew nut can live more than 10 years so that this cash crop can produce long term incomes/profits for the entrepreneurs.

4.6. Step-by-Step guide for cattle raising business

This step-by-step guide was prepared only for cattle raising business; it's should also be part of the M&E section which all IRD staff and consultants need to be aware of. For this cattle enterprise plan, we recommended 6 key steps or guide, which are as follows:

Steps	What to need to be done?
1. Make internal rules for all CF members	Internal rules for cattle raisers or whoever is involved in this business need to clarify their expectations, terms and conditions. The rules should also mention the profits/benefits sharing method and contract format that are produced particularly related to this cattle business. IRD staff or consultants need to discuss and finalize the plan with CF committee on who is responsible for what sector, or to do this and when is the timeline to implement this etc.,
2. Purchase of good quality cows/cattle	This step is one of the most important to make sure that CF members will gain the best quality of cattle, which are either for beef meat processing or for reproduction. Before purchasing cows/ cattle CF committee should also do quotations from different sources of cattle suppliers, for crossbred or native cattle species.
3. Start raising cattle and sign contracts for selected entrepreneurs	This step is needed to start raising cattle right away without waiting too long. But it is also required that we select the right cattle raiser/ farmer with commitment and good attitude so as to ensure the business will be successful at a later stage. The business contract should be signed with the entrepreneur and witnessed by CF committee or village chief.
4. Feeding and caring for cow/ cattle	The cattle raiser/farmer will have some hand-on training on the basic techniques for cattle raising business that include methods of feedings, grass cutting, watering and know-how to do partially fermented fodder and mineral feeder (homemade portable salt) for cattle. There is a guide book produced by MAFF on cattle raising techniques in Khmer version that could be adopted and used by IRD staff or the consultants.
5. Marketing of the products and networking with other actors (including Vet. Association)	Once cattle/ cows are available for sale, the marketing plan will help raiser, farmer or entrepreneur to gain better prices from existing markets. The marketing plan will actors understand the supply/ value chain of cattle in the area while networking with other actors. Current market demands on beef cattle are increasing in all year at urban areas and Phnom Penh.
6. Hold reflection and learning of cattle raising business workshops.	Cattle raiser/farmer will need to hold a reflection workshop/meeting of continuous learning from this business sector as much as possible. Key considerations for making as much profits as possible from this kind of business by doing & learning will help farmers/ entrepreneur gain more and confidence.

4.7. Building Partnership with institutions, NGOs & Service Providers

IRD has already established relationships with some local/provincial NGOs in Kampong Speu and Phnom Penh. There are a number of vegetable producer groups in Kg. Speu Peri-Urban Agricultural Cooperative (PUAC) where they are growing different kinds of vegetable to supply markets in Phnom Penh. They can also link to Agriculture Cooperatives in the commune or other communes within Kg. Speu province who need the services and products of Damrey Chak Thlork CF. The Rattan Association of Cambodia (RAC) is in need to build more partnerships in order to get raw materials or semi-finished products for furniture production. Wild honey production can also be linked to NTFP-EP or CEDAC's shops in Phnom Penh.

Local government at the communes, districts and provincial FA and PDA who have played existing roles and responsibilities to support communities in this area are needed to build partnership with.

4.8. Target beneficiaries/site selection for this enterprise project

There are 9 villages in Kraing Deivay commune; a certain number of villages have access to canal irrigation systems and the reservoirs of Tomnup Angkor Chey where farmers in those villages can have access to water for rice and other cash crop cultivation. Those villages include Prey Ka Heach, Daung, and Banteay Roka village that is located near Tomnup Angkor Chey and Stung Peam Poul. For Damrey Chak Thlork CF, there is very limited water access during dry season, even for domestic use. For implementing this community enterprise project, it is suggested that it should address only Dak Por and Kraing Kor village because of limited budget, but if budget was extended and available for wider scope of the project, then Banteay Roka, Prey Ka Heach and Daung village should also be covered. If so, then the total beneficiaries are as presented in the table 12 below.

Table 12: Proposed beneficiaries covering under this community enterprise project

Name of village	Household	Woman Headed HH	Total Population	
			Total	Female
1. Banteay Roka	217	27	933	472
2. Prey Ka Heach	163	25	661	351
3. Kraing Kor	146	16	568	300
4. Dak Por	242	6	1185	599
5. Daung	203	14	650	333
Total	**971**	**88**	**3997**	**2055**

4.9. Monitoring and Evaluation plan

Monitoring & Evaluation (M&E) is an important task in the life of any project or program including business/ enterprise projects. M&E is a continuous process of regular systematic assessment based on participation, reflection, feedback, data collection, analysis of actual performance (using indicators) and regular reporting. Monitoring will tell us where we are in relation to where we want to be, it helps us keep on track by gathering data and evidence, identifying problems, analyzing issues, and solving some constraints in a timely fashion. CF Committee and its development partner (IRD) will help and supervise the on-going implementation of the enterprise project. Once funding is available, the following points will be applied

- **Monitoring:** This will be done on a monthly and quarterly basis. It is used as a learning tool to improve performance in general. IRD and CF Committee members, sub-committees and trainers will also conduct an annual project reflection or workshop with its stakeholders and beneficiaries. From this review and reflection, we can all learn lessons from implementation with a "Walk the talk" approach.

- Key indicators written in this community based enterprise plan are a compulsory task for ongoing monitoring activities, including the number of cattle increase per year, margin of profit per year per household, number of agricultural skills provided to beneficiaries or producer groups, and other types of cash crops that have been introduced and practiced by CF members.. The business performance indicator will also need to be tracked on all revenues from other services or sales beside cattle and cash crops productions. Those would include the sale of animal fodder, the seedlings extracted from the original trees (bamboo or date palm) and the exchange of experience or training that CF committee have gained from the implementation over the period of time.

- **Evaluation:** Final enterprise project evaluation will be done at the end of each project cycle and Annual reflection workshops will be used in place of mid-term evaluation. Annual reflection and final evaluation will help CF Committee and relevant stakeholders to draw lessons learned and good practices and can design next stage of intervention strategy.

- **Auditing**: CF Committee and donors will routinely organize global external auditing of its finances and financial operations which is required by Cambodian law for all business/ enterprises. It will conduct internal auditing to ensure the efficient use of resources without prior notice, as it implements the program/project. Auditing on financial resources, loans for investment, incomes and expenses and other shareholders are needed to track and report back to CF committee and its members in a transparent manner.

4.10. Staffing and Management Structure and Capacity Development

Current CF management structure is needed to review their committee commitment and willingness and to create other sub-committees for operating this business/ enterprise project (if all are agreed). Additional technical staff and consultants in agriculture, enterprise development, and food processing and market intervention are needed to consider help in implementing this project. Since CF Committee and capacity is limited on financial management, external financial support and reporting required will be hired. Below the CF management structure, there will be sub-committees in charge of business operations, producer's groups and service groups who are in charge of different components as mentioned in the business/ enterprise model 2.

As indicated during Participatory Rural Appraisal, all respondents requested numbers of training for their capacity building including Entrepreneurship Development course (Sensitizing entrepreneurship development, business planning, and financial management and market development). For technical aspect, there should be more related to food processing, packaging and manufacturing technique or other post-harvest management courses.

4.11. Risks and Mitigations mechanism

Since this business/ enterprise model is very much related to agri-products development, supply and service business, the critical risks are mainly related to drought and other climate hazards. However, based on discussions with CF Committee and other key informants, there are also some possible solutions or mitigation mechanism for managing those risks as indicated in the table below.

Businesses/ Enterprise risks and possible solutions for CF area

Future business/ enterprise development	Risks/ Constraints (L- M -H)[10]	Possible solutions/ Mitigation mechanism
Cattle (cows) raising	Some cattle diseases that are uncontrollable by village veterinary (M)	Working with Vet. Association in the commune and keep network and communication with Livestock Department regularly, especially if there was something unusual. Risk here is not including environmental and social risk assessment. This could be further considering while doing impact evaluation.
	Drought (M)	Water for cattle is also vital and must be available all year round inside the CF site, especially near the location of cattle farms. Digging reservoirs or ponds to store water may be the best solution. Alternative solutions will also be looked into.
	Lack of fodder during dry season (L)	For achieving enough feed, fodder for cattle/ cows, King Grass/ elephant grass growing is recommended inside the CF site. In most cases, farmers/ entrepreneurs can make partially fermented fodders for cattle or cows using indigenous grasses available during rainy season and or from other kinds of fodder such as corn plants, rice straw etc., The method of doing fermented fodder is very simple and has a lower cost than growing king grass or elephant grass.
Chicken raising	Past experience of bird flu disease breaking out (H)	Working with Vet. Association in the commune and continue networking and communication with Livestock Department regularly, especially if there is something unusual. CP company in Kg. Speu has a number of high quality vet/experts to advice advise on this matter also. Chicken producer groups can also do contract farming with CP in Kg. Speu to supply chickens and other raw materials for animal feeds to them.
Pigs raising	Diseases may be uncontrollable by locals	Working with Vet. Association similar approach with cattle and chickens. For market price

[10] L= Low, M= Medium, H= High)

	for pigs Market price fluctuations (H)	fluctuation, the project should establish business groups who are in charge of the marketing sector and have wider networks outside the community. Similar methods applied to the chicken business which needs to work along with other private company (e.g. CP) or Mong Reththy Group.
Rice growing	Disaster from flood and drought, and pests (M)	Work with Agronomist/ experts in pest control. Flood and drought control needs wider intervention from local, district and provincial authorities. We need to promote infrastructure development focusing on irrigation systems for supporting this solution. Without infrastructure for water harvesting and control, it would be difficult to succeed in any of the other projects. If we are to grow rice for export, the 3 most potential villages in Kraing Deivay as mentioned earlier are recommended to form rice producer groups including production of rice seeds.
Cash Crops/ Fruit&Vegetable growing	Lack of water during dry season (H)	Working with Agronomist similar to the rice sector. Cash crops/ fruit production can be done at Damrey Chak Thlork CF area. This application can be done both at household level and CF site. Water storage facility is needed to make sure that growers can access water all year round.
Human Resources	Lack of laborers (due to the fact that they are out-sourced)	Providing competitive salary/ benefits for working within the community. Other incentives such as vocational skills, technologies and adequate support from NGOs or development partners. Changing mindset from being an employee to being an employer (through entrepreneurship capacity building) would help local villagers see the potential development of cash crops in their village rather than just for employment outside with greater risks.

5. Conclusion of the Enterprise plan and Implementation plan

It is concluded that cattle raising business integrated with other high value cash crops would be most advantageous for achieving economic growth, forest conservation and self-financed strategies of the

communities in Damrey Chak Thlork CF. In addition, high value cash crops such as Date Palm, Seedless Lemon, Sweet Bamboo, Lemon Grasses, and Cashew Nut are also considered to be suitable crops for planting integrated in the area.

Agricultural Cooperative concepts are being applied in Kraing Deivay commune and therefore it is also good to work for Damrey Chak Thlork particularly in order to address long term farmer's business advantages in Cambodia. But this concept requires longer than three years and more financial resources to implement it.

This community based enterprise plan clearly spells out that IRD as project implementer under APFNet support will only support or contribute some costs for purchasing cattle, roof of cowshed, and other materials while CF Committee/ member will pay for their own labor costs, construction material, fences, home-stay of its staff/workers and other infrastructure inside the CF site.CF Committee need to solve any potential conflict of interests among its CF Committee and members and to make sure that they can carry out the investment, business operation by themselves with minimal support from outside.

The proposed workplan for cattle raising and capacity development is presented below table.

		Description of Activities	Timeline/ Year		
Business Sector	**Activity**	**Details**	**1**	**2**	**3 to 5**
Cattle raising (start ASAP)	Building infrastructure	Identify locations for building houses, fence, digging ponds growing grass purchasing cows/ cattle	Sub-group formation Buying cows	Continued implementation & Expansion	Continued implementation & Expansion
Cash/ High Value Crops At the later stage of development	Producer group/ entrepreneur group	Identify crops, Water/ irrigation system Purchase input supplies	Group formation	Continued implementation & Expansion	Continued implementation & Expansion
	Diversification of Livelihoods and high ***value cash crop***[11] development	Date-palm trees, Seedless Lemons, Sweet bamboo Lemon grasses, Cashew nuts, Cassava	Identification/ Capacity Building Business plan	Technology Transfer/ Capacity Development/	Implementation& follow up
	New Innovations	To be decided (e.g. Frogs or Quails raising, NTFPs processing pickling/ canning and storage Food processing)	Identification/ Value Chain Analysis, Capacity Building, Group formation	Technology Transfer/ Capacity Development/	Implementation& follow up
Agricultural Cooperative (AC). At the later stage of development	Forming, Registration, and functioning AC	To be decided in Forming different producer groups on rice, fruits & vegetable group, fertilizer group, rice collector, and credit group.	Groups member identified and formed, Members will get trained and running.	Technology Transfer/ Capacity Development/	Implementation& follow up

[11] These cash crops should be considered whenever financial capital for investment is available and also need to re-assess the current status of forestland if environmental damages are greater than economic values of those crops.

Description of Activities			Timeline/ Year		
Business Sector	**Activity**	**Details**	**1**	**2**	**3 to 5**
Capacity Building/Business Development skill					
Entrepreneurship course (start ASAP)		1. Change of mindset from farmer to be an entrepreneur, 2. Business plan development, 3. Financial resource management/ book keeping, 4. Marketing and trading skill	Year 1		
Technical skill (start ASAP)		1. Cattle raising and 2. Other cash crops growing skills 3. Maintaining technologies such as DIS, BGD and other materials 4. Post-harvest for vegetable, fruits and rice 5. NTFP processing skills 6. Food processing skills	Year 1	Year 2	

6. Financial plan and resources mobilization

There will be a need for clear financial planning and resource mobilization to make sure that any business/ enterprise can be operated properly and remain fully functional. Decisions to be made for each investment can be based on economic benefits for each business sub-sector and resources required in each steps. However, the EDI team can help CF Committee and IRD to develop proposals for submission to any potential donors or sponsors or investors who really want to help Community Forestry in this area to realize their business potential and to conserve their forest resources effectively in the near future. Budget phase-out for each segment of business will be developed at a later stage in consultation with IRD and relevant stakeholders.

There is a very limited financial capital available from IRD, approximately $5,000 for start-up capital for any identified business/ enterprise development during this stage for Damrey Chak Thlork CF. However, with this money, if it is decided to go with a cattle raising business (as strongly recommended here) CF committee can purchase up to 8 cattle/cows for the start-up, leaving $1800 for contingency costs.

This below budget is needed only for cattle raising business and if decided for other high value cash crop productions. Each business sector budget was not detailing any infrastructure costs such as office space, cattle fences, cow's house/pen, pond or reservoir to store water.

No	Description of Activities	Unit of Measurement	Costs Needed at First Stage (USD)	Source of Fund	Responsible by
1	Cattle raising business (Model A1)	3 cows	1,638	Donor grant	CF Committee
2	Cattle raising business (Model A2)	3 cows	4,785	Donor grant	CF Committee
3	Cattle raising business (Model A3)	60 cows	60,900	Donor grant	CF Committee
4	Date Palm Production	1 ha	6,390	Biz Loan	CF Committee
5	Seedless Lemon Production	1 ha	3,633	Biz Loan	CF Committee
6	Sweet Bamboo Production	1 ha	4,130	Biz Loan	CF Committee

7	Lemon Grass Production	1 ha	1,920	Biz Loan	CF Committee
8	Cashew Nut Production	1 ha	2,163	Biz Loan	CF Committee

As this project is developed for and participated by CF committee, it is also suggested that all costs and in-kind contribution is needed to factor-in such as building fence of the cattle, cow's house/pen and pond or reservoir to store the water for these business purposes are made by the communities.

7. Annexes

7.1. Cattle Costs and Benefits table

7.1.1. Costs and Returns on Improvement Forages for Fattening Beef Cattle in 90 days cycle

Cattle Production	Y1	Y2	Y3	Y4	Y5
1. Cost of Forage Establishment	**78**	**35**	**35**	**35**	**35**
Land preparation	10	0	0	0	0
Labor (weeding, planting, maintenance)	15	15	15	15	15
Fertilizer (NPK)	20	20	20	20	20
Cost of forage seeds (Mulato II and Stylo 184)	33	0	0	0	0
2. Operational Cost	**1,560**	**860**	**860**	**860**	**860**
Deworming	15	15	15	15	15
Castrate	30	30	30	30	30
Middlemen fee	15	15	15	15	15
Cows purchase (3 head)	1,500	800	800	800	800
Total cost	*1,638*	*895*	*895*	*895*	*895*
3. Returns	**3,105**	**3,105**	**3,105**	**3,105**	**3,105**
Sale of fattened cows (3 head)	3,000	3,000	3,000	3,000	3,000
Sale of forage stems	45	45	45	45	45
Sale of manures	60	60	60	60	60

7.1.2. Costs and Returns on Reproduction of Cattle in 120 days cycle

Cattle Production	Unit of measuring	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Cost:		***4,578***	***0***	***0***	***0***	***0***
Cost of acquiring start-up female cattle (pregnant)	3 head	4,500	0	0	0	0
Cost of forage farm establishment: seeds and land preparation (Year 1)	30 acres (12.14 ha)	78	0	0	0	0
Operating Cost:		***207***	***207***	***207***	***207***	***207***
Forage farm labor and fertilizer (Year 2)	30 acres	35	35	35	35	35
Rice bran for female cow for dry season: 1000R/cattle daily (60 days/year x 2 years)	120 day	60	60	60	60	60
Rice bran for heifer for the dry season: 1000R/cattle daily (60 days/year x 2 years)	120 day	60	60	60	60	60
Vaccination, Pasteurella and Deworming @ 32,000 x 2 per year (female) x 2 years	3 head	16	16	16	16	16
Vaccination, Pasteurella and Deworming @ 32,000 x 2 per year (offspring) x 2 years	3 head	16	16	16	16	16
Castration of male offspring for sale	2 head	20	20	20	20	20
Total of Production Cost		**4,785**	**207**	**207**	**207**	**207**
Returns		**3,012**	**3,012**	**3,012**	**3,012**	**3,012**
Sales in Year 2 (1500$/cattle; assumes only 2 female offspring)	2 head	3,000	3,000	3,000	3,000	3,000
Sales manures in year 2 (average 45,000R)	Dung/kg	12	12	12	12	12

7.1.3. Costs and Returns on Combined Reproduction & Meat in per ha per year

Cattle Production	Unit of measuring	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Cost:		***60,500***	***0***	***0***	***0***	***0***
Cost of acquiring start-up female cattle (Pregnant)	50 head	50,000	0	0	0	0
Cost of acquiring start-up male cattle (Adult)	10 head	10,000	0	0	0	0
Cost of forage farm establishment: seeds and land preparation (Year 1)	1 ha	500	0	0	0	0
Operating Cost:		***400***	***400***	***400***	***400***	***400***
Forage farm labor and fertilizer (Year 2)	1 ha	40	40	40	40	40
Vaccination, Pasteurella and Deworming @ 32,000 x 2 per year x 5 years	60 head	360	360	360	360	360
Total of Production Cost		**60,900**	**400**	**400**	**400**	**400**
Returns		**50**	**40,050**	**40,050**	**40,050**	**40,050**
Sales in Year 2 (1000$/cattle; assumes only 40 cows are available for sale)	40 head	0	40,000	40,000	40,000	40,000
Sales manures in year 1 (average 50$/year)	Dung/kg	50	50	50	50	50

7.2. Cash Crops Costs and Benefits table

7.2.1. Costs and Returns of Date Palm plantation (through contract farming)

Date palm (USD/ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Costs	**6,390**	**890**	**940**	**940**	**940**	**140**	**140**	**140**	**140**	**140**
Land Preparation	400	-	-	-	-	-	-	-	-	-
Seedlings	3,400	-	-	-	-	-	-	-	-	-
Fertilizers	800	800	800	800	800	-	-	-	-	-
Watering system/DIS	1,500	-	-	-	-	-	-	-	-	-
Weed maintenance (Herbicide)	90	90	90	90	90	90	90	90	90	90
Fruits collector	-	-	50	50	50	50	50	50	50	50
Pumping motor	200	-	-	-	-	-	-	-	-	-
Returns	**0**	**0**	**6,000**	**12,000**	**24,000**	**18,000**	**24,000**	**18,000**	**24,000**	**18,000**
Contract farming (sale for 3$/kg)	0	0	6,000	12,000	18,000	18,000	18,000	18,000	18,000	18,000
Sale of Seedlings	-	0	-	-	6,000	-	6,000	-	6,000	-

7.2.2. Costs and Returns of Date Palm plantation (through current market price)

Date palm (USD/ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Costs	**6,390**	**890**	**940**	**940**	**940**	**140**	**140**	**140**	**140**	**140**
Land Preparation	400	-	-	-	-	-	-	-	-	-
Seedlings	3,400	-	-	-	-	-	-	-	-	-
Fertilizers	800	800	800	800	800	-	-	-	-	-
Watering system/DIS	1,500	-	-	-	-	-	-	-	-	-
Weed maintenance (Herbicide)	90	90	90	90	90	90	90	90	90	90
Fruits collector	-	-	50	50	50	50	50	50	50	50
Pumping motor	200	-	-	-	-	-	-	-	-	-
Returns	**0**	**0**	**30,000**	**60,000**	**96,000**	**90,000**	**96,000**	**90,000**	**96,000**	**90,000**
Market Price (sale for 15$/kg)	0	0	30,000	60,000	90,000	90,000	90,000	90,000	90,000	90,000
Sale of Seedlings	-	0	-	-	6,000	-	6,000	-	6,000	-

7.2.3. Costs and Returns of Seedless Lemon

Seedless Lemon (USD/ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Costs	**3,633**	**280**	**280**	**280**	**280**	**280**	**280**	**280**	**280**	**280**

Land Preparation	400	-	-	-	-	-	-	-	-	-
Seedlings	1,043	-	-	-	-	-	-	-	-	-
Fertilizers	300	90	90	90	90	90	90	90	90	90
Watering system/DIS	1,500	-	-	-	-	-	-	-	-	-
Weed maintenance (Herbicide)	90	90	90	90	90	90	90	90	90	90
Insecticide	50	50	50	50	50	50	50	50	50	50
Fruits collector	50	50	50	50	50	50	50	50	50	50
Pumping motor	200	0	0	0	0	0	0	0	0	0
Returns	**15,000**	**30,000**	**48,000**	**48,000**	**48,000**	**48,000**	**48,000**	**24,000**	**24,000**	**24,000**
Market price (sale for 1.2$/kg)	15,000	30,000	48,000	48,000	48,000	48,000	48,000	24,000	24,000	24,000
Sale of Seedlings	-	-	-	-	-	-	-	-	-	-

7.2.4. Costs and Returns of Sweet Bamboo

Sweet Bamboo (USD/ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Costs	**4,130**	**230**	**230**	**230**	**230**	**230**	**230**	**230**	**230**	**230**
Land Preparation	400	-	-	-	-	-	-	-	-	-
Seedlings	1,800	-	-	-	-	-	-	-	-	-
Fertilizers	90	90	90	90	90	90	90	90	90	90
Watering system/DIS	1,500	-	-	-	-	-	-	-	-	-
Weed maintenance (herbicide)	90	90	90	90	90	90	90	90	90	90
Pumping motor	200	0	0	0	0	0	0	0	0	0
Bamboo shoot collector	50	50	50	50	50	50	50	50	50	50
Returns	**2400**	**9,000**	**51,000**	**51,000**	**51,000**	**51,000**	**51,000**	**27,000**	**27,000**	**27,000**
Market price (sale for 2$/kg)	2400	6,000	48,000	48,000	48,000	48,000	48,000	24,000	24,000	24,000
Sale of Seedlings (2&/seedling)	-	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000

7.2.5. Costs and Returns of Lemon Grass

Lemon Grass (USD/ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Costs	**1,920**	**420**	**420**	**420**	**420**	**420**	**420**	**420**	**420**	**420**
Land Preparation	90	90	90	90	90	90	90	90	90	90
Seedlings	50	-	-	-	-	-	-	-	-	-
Fertilizers	50	50	50	50	50	50	50	50	50	50

Watering system/DIS	1,500	250	250	250	250	250	250	250	250	250
Weed maintenance	30	30	30	30	30	30	30	30	30	30
Pumping motor	200	-	-	-	-	-	-	-	-	0
Returns	**3800**	**3,850**	**3,850**	**3,850**	**3,850**	**3,850**	**3,850**	**3,850**	**3,850**	**3,850**
Market price (sale for 0.38$/kg)	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800
Sale of Seedlings	-	50	50	50	50	50	50	50	50	50

7.2.6. Costs and Returns of Cashew Nut

Cashew nut (USD/ha)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Production Costs	**2,163**	**345**	**345**	**345**	**345**	**345**	**345**	**345**	**345**	**345**
Land Preparation	90	90	90	90	90	90	90	90	90	90
Seedlings	78	-	-	-	-	-	-	-	-	-
Planting labor	40									
Fertilizers	90	90	90	90	90	90	90	90	90	90
Watering system/DIS	1,500	-	-	-	-	-	-	-	-	-
Weed maintenance	90	90	90	90	90	90	90	90	90	90
Pesticide	25	25	25	25	25	25	25	25	25	25
Pumping motor	200	0	0	0	0	0	0	0	0	0
Fruit collector	50	50	50	50	50	50	50	50	50	50
Returns	**-**	**-**	**4,500**	**4,500**	**4,500**	**4,500**	**4,500**	**4,500**	**4,500**	**4,500**
Market price (sale for 1.5$/kg)			4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
Sale of Seedlings	-	-	-	-	-	-	-	-	-	-

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