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Assessing the Feasibility for Changing from Beef to Dairy Enterprise (Case Study)

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Introduction:

The use of capstone course for agricultural college senior students is a new experience to most students and faculties in Egypt. Capstone course considered as transition period for students to be weaned from the undergraduate status and existential condition to incorporate as graduates prepared to act responsibly in civil society. It brings an exciting real world situation to the classroom teaching of agribusiness or animal science courses. As one of the educational quotes said by George Washington Carever “Education is understanding relationships", the capstone course provides students with opportunities to apply a variety of analytical techniques and integrate among different disciplines to everyday real life agribusiness situation and practice decision making process. Decision making is at the heart of what managers do. The decisions make direct influence on the level of future revenues, costs, and profits of an agribusiness firm and eventually success. Therefore, it is important to develop the student’s ability to apply classroom training in economics and animal science to agribusiness problem solving in order to make decision making easier, improve the quality of decisions, reduce the time required to make decisions, and increase the frequency of correct decisions. Use of some case studies through the capstone course gives students the chance to develop these critical decision making skills in the classroom so they will be better prepared to meet the challenges of the workplace. After the case study has been completed, most students will find them to be a challenging experience. Case study solutions require a different approach than do normal homework exercises. There may be several right answers to each case depending on how the problem is defined and the assumptions that are made. Besides the decision making skills gained while students are working on the case study, another skills are acquired such as communication, team working and managerial skills. The following figure represents the main concept of capstone course and how it proceed through a whole semester.

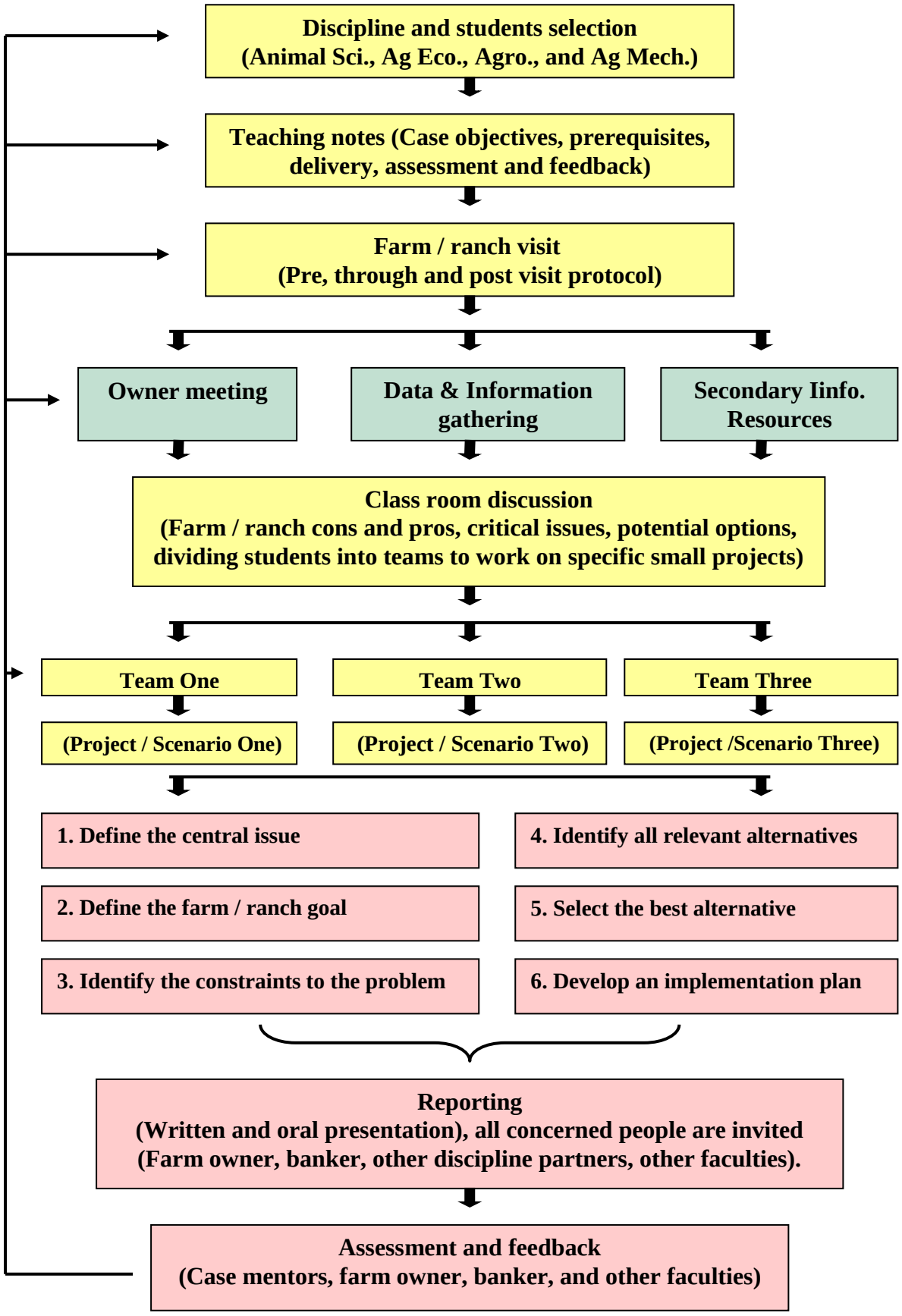


Figure 1: Schematic diagram illustrates the implementation steps of case studies through the capstone course.

Types of case studies:

There are many different types of cases could be applied for problem-based learning in classroom. The simple one is mainly context-based and applied for one or two classes or could be delivered as home assignment. This type is simple as much as students do not spend too much time solving it. The second type could be context or search based and is longer and complex than the first one and always takes few weeks to be solved and kind of coaching is needed by the instructors and students often work on the solution as a team. The third type of cases is much complex and delivered for the entire semester through capstone course and characterized by students, faculties and stakeholders collaboration. This type of cases could be as analytical study for the enterprise or emphasis on specific problem and different potential options are needed to overcome the dilemma. Students often work in interdisciplinary or multidisciplinary groups and ended by report writing and presentation. Such kind of cases is given to senior students as transitional (nursery) period prior graduation.

Important features of the case study:

The most important features are the case or problem itself, the procedure the instructor uses, and the attitudes and the relationships that exist in the class. Smith, 1999 summarized the features of the problem or case as (1) a context-based, relevant and relatively realistic scenario; (2) a challenging but not too frustrating problem, task, or solution; (3) a somewhat open-ended problem or situation that require careeful exposure and list of assumptions; (4) a problem or situation that motivates students to explore, investigate and study; (5) a problem or situation that encourages interaction among students, between students and faculty, between students and outside resources; and (6) a problem that require integration of broader aspects, including technical, economic, social and ethical and environmental aspects.

Teaching notes:

Having clear and well organized teaching notes about the course and how students will proceed through the cases is the key point to achieve the ultimate goals of that course. Teaching notes are widely different depending on the type of the case, the phase of the study and if the case is one class, multi classes or a whole semester. For that kind of cases which taught through a capstone course, teaching notes should be comprehensive and describe in details what students are going to do. In that case it looks any other

course description or specification. The most important teaching notes are the main objectives of the case, the course notes and readings required to help students solve the case, the case activities and tentative time schedule, and eventually the method of the case assessment and feedback.

Course objectives:

In completing this capstone course student will be able to:

1. Appreciate the discipline and how sub-fields relate to each other.
2. Relate between academics and practice in the discipline.
3. Think creatively using problem solving approach.
4. Appreciate team working and collaborative learning.
5. Write a technical and financial report describing the enterprise situation.
6. Present and speak effectively on publics.
7. Practice decision making and its impact on the other enterprise activities.
8. Search and brows for knowledge and information in different sources.

Course specific notes:

Teaching notes of the capstone course depends on the disciplines that are merged together to conduct the case study. For this course, both animal science and agricultural economics are the main disciplines assigned to cooperate. Sub-disciplines are required to prepare students for conducting the case. Students are asked to taking over their responsibility and revise the following courses.

- Dairy management:

Topics that would be especially appropriate for students to revise are culling rates and reasons, fertility parameters including number of servings per conception, calving intervals, days open, milking parlor management and records reading and interpretation.

- Animal nutrition:

Nutrient requirements calculation, feed bunk management, rumen function and factors affecting digestion performance, feed additives, calves and heifers nutrition and nutritional disorders are the most likely important topics the student should revise.

- Farm and ranch management:

Principles of farm decision making, production cost and revenue calculation, budgets and farm budgeting, and Tactics and strategic planning are the most appropriate topics to be revised.

- Agribusiness management:

Students are obliged to strengthen their knowledge in the following topics SWAT analysis, marketing analysis, financial analysis (balance sheet, cash flow and income statement).

Other courses and areas of specialties might be important to carery out the case. On average, three areas of specialization are used for the case; those could be interdisciplinary or multidisciplinary case study. In that case the faculty might have more than capstone course, depending on how much the different disciplines are overlapped and interacted. In this concern, Agricultural Economy or Agribusiness consider as a common factor for all capstone courses. For instance, the following disciplines might have a collaborative capstone course (Animal Science, Ag Economics, Agronomy and Ag Mechanics), (Ag Mechanics, Ag Economics, Soil, and Agronomy), (Animal Science, Agronomy, Ag Economics and plant protection), (Dairy and Food science, Chemistry and Ag Economics), and (Horticultural, Agronomy, Ag Mechanics and Ag Economics).

Case delivery:

Students could goes in two ways; 1) to pin point the critical issue challenge the enterprise through data mining and information interpretation or 2) to be oriented to definite problem or challenge stated by the farm/ranch owner and start to work on. The first approach is preferable, where students will be acquainted to analyze the situation and figure out the most critical issue that the enterprise encounter. That will encourage student's abilities for analysis, synthesis and innovation.

Regardless the way of delivery, students with their mentors have to visit the allocated farm/ranch to gather all the information needed for the case and have an easy access to the farm site and consolidated relation with the farm owner as more information and data may be needed while the case is developing. Text books, lecture notes, Internet, scientific articles and course mentors are other recommended resources for extra information. In some cases not all the required information are available and students have to set a list of assumptions to achieve the case. For a

reason or another, the financial data representing costs and revenues of the enterprise always not easily accessed and both mentor and students should be careeful when they gathering such kind of information and it is preferable to get it through indirect question. The following table contains the suggested time schedule for the case.

Tentative schedule for capstone course delivery.

W	Activity	Place	Responsible
1	Students reception and orientation	Class	Mentors
2	Dispatch course teaching notes for reading	Class	Mentors
3	Arrangement for farm / ranch visit and roles distribution for the visit	Class	Mentors
4	The first farm / ranch visit	Farm	Mentor / stud.
5	The second farm / ranch visit (if needed)	Farm	Mentor / stud.
6	Discussion for addressing the critical issues and dividing students into working teams equal to the number of issues	Class	Mentors
7	Working on the cases as team	Free	Students
8	Working on the cases as team (cont.)	Free	Students
9	Working on the cases as team (cont.)	Free	Students
10	Getting preliminary confirmation from the owner for the data used in the case	Farm	Mentor / Owner
11	Oral presentation for all teams	Class	Mentor / stud
12	Final feedback and assessment	Class	All
13	Handed written report	Mentor	Students

Students monitoring and support:

Before performing the case, students should be provided with the suitable orientation in classroom for what is meant by case study, what is the importance to go through such kind of activity, what are the norms and regulations for the farm site visit (before, through and after), how are the team work forms and performs smoothly, what is expected from students to be able to do by the end of the case, how they will communicate with their mentor, and finally how they will present their case and whom are expected to attend their final presentation. Many questions and thoughts need to be answered and clarified before starting and through the case. Another important issue is to distribute tasks for the team members and make an action plan or time outline to execute the case, considering the allowed semester time and students should work as business oriented. Fully informative contact list

(Phone number, office hours, E-mail) of students participating the cease, mentors and farm/ranch owners is quite important to have a good communication. Each other week classroom session is highly recommended to have discussion and determine the student's progression through the case. The co-teaching and co-coaching of the different discipline mentors is quit important that students can get a whole bunch of integrated information and knowledge to know how to but it in their study. Students suppose to work as collaborative groups all the time to get benefit from each other.

Student's assessment and feedback:

Student's assessment through the capstone course goes in many ways. Students will appraise themselves inside each team (students asked to design an evaluation form for the team performance). Mentors will have the grate portion for the case assessment. In addition, the outer partner (stakeholder), invited practitioner and banker will have the opportunity to asses the case and give their feedback to the students. The following table (Table2) represents the criterion used for assessment.

Table 2: Criterion used for students assessment through the case / capstone course.

Criterion	**Weight (%)**	**Mentor**	**Owner**	**Banker**	**Average**
Critical issue identification and Problem statement	20				
Potential options and their impact on other enterprise components	20				
Small projects for corrective actions	30				
Report writing	10				
Oral presentation and case defense	10				
Team work ability	10				
Total	100				

All students participating the case study are required to make self assessment and give their feedback about the experience that they gained from the case and if met their expectations or not. Also, a satisfaction letter should be written by the farm owner and the banker as well to prove the validity of the case. All the feedback will be discussed on the department level to improve the fore coming cases.

Constraints of the case execution:

One of the most important constrains and challenges that students could face while they are gathering the needed information and data, the lake of data and information system that provide an accurate and précised data. The financial data referring to budget, cash flow, costs and revenue are the most critical and hot points that students could face and in many cases they are obliged to assume it. The concept and vision of the enterprises owners for the case study impotence as a unique learning opportunity for students is quite needed to make breakthrough with student's future career. Students have to build a good relation and effective communication as teams especially they are belong to different disciplines and one of them could be assigned as coordinator.

The case writing:

There are essentially two approaches to writing a case study. In the one call it "teaching case" were the problem / case study should be designed so that it requires about one academic week of the course. The summary is limited to one – one and half pages and should provide enough information which includes a summary of the problem, the objective of the case, the relevance of the problem to the subject and other discipline if possible, the estimated time to be spent on the case, a list of required resources that may not be available (optional), what is the main issue or problem, and suggested means for student evaluation. The other approach which is called "research case", so that the case is presented with much detailed information, including full description of the case, detailed teaching notes, directions and any other supplementary information. A model for each case is written down.

One class case model:

Brother's bull calve farm

When dairy producers have faced reduction in raw milk price and a minimum of 5 tons milk quotas should be contracted with dairy products companies, the brother's dairy farm started to shift their activity from milk production into bull calve production in 1998 using their cows as foster mothers to achieve more profit. Brother's farm is a family farm for the third generation and located in Upper Egypt. This farm was established at 1908 as small traditional barn for milk production by the owner's father. The farm grew slowly till the beginning of seventies, and then

herd size increased remarkably till the middle of nineties. Beef stocker production is the main livestock production system of brother's farm, where growing stocker are marked at two weights, 200-220 Kg and slaughter weight 400-450 Kg. Sometimes, 100 Kg calves are sold to another farm if liquidity is required or many calves are raised over the farm capacity. Milk yield of the mother cows is used for suckling the newly born calves besides three baby buffalo or Baladi calves purchased from the local market "small holders". Medicinal plants such as Anis, Fennel, and horticultural plants such as onion, grapes, Potatoes are also produced for both international and local marketing. In addition, the farm produce forage crops such as Egyptian clover and maize for silage making, extra tons of silage is purchased from the market to fulfill animal's requirements.

The farm total size is 70 acre cultivated with forage plants (maize in summer), while, 25 acre clover, 27 acre medicinal plants, 7 acre onion, 10 acre potatoes and 5 acres of grape and the remainder is the livestock barns, calves housing and other constructions. The livestock farm herd size is used for 500 head, distributed as 210 lactating Holstein cows, 5 brown Swiss, 160 male calves, 122 heifers and 3 bulls). The full bull calves capacity of the brother's farm is 350 - 400 calves a year. However, the farm is a family business, both livestock and cropping systems are managed separately, and each has it's own accounting and budget. All brothers share responsibilities in management, and have specific roles are distributed. There is no clear idea for the future ownership among the coming offspring and followers. The decision making process involves voting and agreement among all brothers. The farm has daily, weekly, monthly and occasional operations. The daily operations are cow feeding, clave suckling, and clover cutting. The weekly operations are feed mixing, and cultivated land irrigation. The monthly operations are animal weighing and manure disposal, the occasionally operations are silage making, crop harvesting, vaccination, calves purchasing and marketing. The farm recruits two kinds of labor; 7 permanent labors for livestock operations and 20 casual labors for land operations. Most of casual labors are women for handing and harvesting of horticultural crops. The farm has two tractors, grinder, feed mixing unit, chopper, water pumps, and vehicle. Four fenced and shaded yards are constructed for cows housing. Suckling utensils, clinic for medication and vaccination are also available on the farm. The farm has minimal record keeping

system. The culling rate is 5-10 %. The farm depends on the natural breeding system using Holstein sires purchased from local producers. The farm has two main marketing seasons for fattened calves; the first one at 200 -220 Kg live weight for other farms who feed them until they reach slaughter weight. The second is the occasion of Pilgrim "scareification feast vale". Usually the farm has names and phones list of the traders who are mostly butchers to contact when stockers are ready to be marketed or slaughtered. The current price is L.E.15 /Kg live weight of baladi calves and L.E.13.5 for buffalo calves. The is no middlemen in farm marketing chain to maximize profit. For horticultural and medicinal plant products, the farm has anticipated potatoes contract with CHIPSY "crispy manufacturing company" and with the exporters for the medicinal plants. As the state encountering a severe meat production gap and the demand is always higher than the market capacity, this farm has no problem with competition inside their district or even outside. For the horticultural crops, the farm may not face a real competition from other producers since they are registered as organic farm and have access to the EU market. As a result of having a large number of replacement heifers, the farm owners are welling to maximize productivity and increase their profit. In addition, they wish to consider how best to use the neo land.

Think first, ink on your paper second, and then share your classmate to answer the following questions:

1. What are the major options available for brother's farm to improve profitability?
2. What are the positive and negative impacts of your potential options / suggestions?
3. If the option you select is implemented, which management and production factors will be impacted? i.e. Labor…

Whole semester case model:

Farm description

Farm Name:

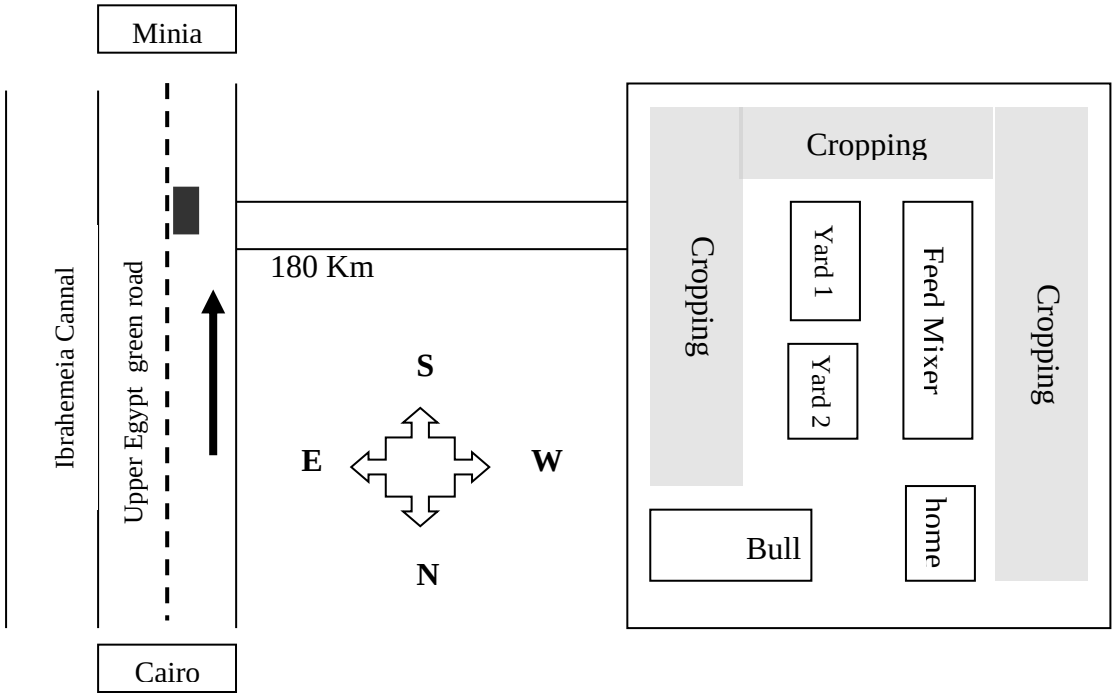
Brother's farm for bull calves and organic horticulture production (mixed production system).

Ownership:

Family farm, third generation, brothers and there sons are running the farm. There is no imagination for the future ownership for that farm.

Location:

The farm is located in Upper Egypt region, 70 Km to North Minia city, 180 Km from Cairo.



History:

This farm has been established at 1908 as small traditional barn for milk production by the owner's father. The farm grew slowly till the beginning of seventieth, and then herd size increased remarkably till the middle of ninetieth. At 1998 brothers changed the system from milk to beef production as milk price was low and marketing problems were encountered for the low milking capacity of the farm and lower bargaining power. The farm has 27 acre registered as an organic farm for

medicinal plants production since 2003 by one of the Switzerland's certification bodies.

Products:

Beef stocker production is the main livestock production system of Brother's farm, where growing stocker are marketing on two weights, 200-220 Kg and slaughter weight 400-450 Kg. Sometimes, 100 Kg calves are sold to another farm if liquidity is required or many calves are raised over the farm capacity. Milk yield of the mother cows is used for suckling the newly born calves besides two baby buffalo or Baladi calves burchaed from the local market "small holders". Medicinal plants such as Anis, Fennel, horticultural plants such as onion, grapes, Potatoes are also produced for both international marketing and local one. However the farm produce forage crops such as Egyptian clover and maize for silage making, extra tons of silage is purchased from the market to fulfill animal's requirements.

Farm size:

The farm total size is 70 acre cultivated with forage plants (maize in summer), while, 25 acre clover, 27 acre medicinal plants, 7 acre onion, 10 acre potatoes and 5 acre grape and the rest is the livestock barns, calves housing and other constructions. The livestock farm herd size is 500 head, distributed as 210 lactating Holstein cows, 5 brown Swiss, 160 male calves, 122 heifers and 3 bulls).

Management structure:

However, the farm is a family business, both livestock and cropping systems are managed separately, and each has its own accounting and budget. All the brothers are having sharing responsibilities in management, and specific roles are distributed. Each activity managed as a separate farm to the extent that they buy and sell to each other.

Decision making:

Decision making process is taking over by voting and agreement among brothers. They are sharing management responsibilities for both livestock and horticulture production as a natural expansion for their fathers. Their responsibilities are implicitly representing their father's responsibilities.

Operations:

The farm has daily, weekly, monthly and occasionally operations. The daily operations are cows feeding, claves suckling, and clover cutting. The weekly operations are feed mixing, and cultivated land irrigation. The monthly operations are animal weighting and manure disposal by ordinary method, the occasionally operations are silage making, crop harvesting, vaccination, calves purchasing and marketing.

Labor:

The farm recruits two kinds of labor; 7 permanent labors for livestock operations and 20 casual labors for land operations. Most of casual labors are women for availability rather than men who are working all the day time in the land cultivation and also for their delicate handing and harvesting of horticultural crops.

Farm facilities:

The farm has two tractors, grinder, feed mixer, chopper, water pumps, and vehicle. Four fenced and shaded yards are constructed for cows housing. Suckling utensils, clinic for medication and vaccination are also available in the farm.

Marketing:

The farm has two main marketing seasons for fattened calves; the first one at 200 - 220 Kg live weight for another farms to continue up to reach slaughter weight. The second is the occasion of Pilgrim "scareification feast vale". Usually the farm has names and phones list of the traders who are mostly butchers to contact them when stockers are ready to be marketed or slaughtered at price of L.E.15 /Kg live weight of baladi calves and L.E.13.5 for buffalo calves. There is no role for middlemen in farm marketing chain to maximize profit. For horticultural and medicinal plant products, the farm has anticipated potatoes contract with CHIPSY "crispy manufacturing company" and with the exporters for the medicinal plants.

Competition:

As the state encountering a sever meat production gap and always the demand is higher than the market capacity, this farm has no problem with rivalry inside Minia governorate or even outside. For the horticultural crops, the farm may not face a real competition from other producers since they are registered as a bio farm and has access to the EU market.

Farm challenges:

As mentioned by the farm owners, the main challenges that they considering are; 1) the ownership perspective for the fourth and up coming generations and how they are worried about maintaining and expanding the farm, 2) the farm has a limited data system, where manual recording is the predominant system, and 3) the farm owners are welling to transfer into dairy operation as nowadays milk price is going up and a considerable number of farm-raised heifers are available, but they do not have a good perspective for marketing and profitability and a proper decision not reached yet.

Farm goals and directions:

The farm has a tactic goal which to establish dairy operation in a new reclaimed area nearby the old farm. Having an extra replacement heifers and considerably encouraging milk price are the main reasons for this transfer. One strategic goal for the farm, as an organic farm registered privilege, is to produce organic milk and distribute it to hyper retails in the domestic market or might be to international market.

Objectives of the present case study:

This case aims to enable the farm owner to make a decision of keeping on the existed enterprise or make an expansion with another 200 lactating cows and think of milk replacer as alternative for feeding the newly born calves. In addition, transferring into milk production is a profitable and feasible or not to make the proper decision for dairy operation expansion.

I. THE CURRENT ACTIVITY SENARIO

Bull calves production through foster mother system

Income:

1. Main products (bull calves at 250 and 450 Kg)
2. By products (manure)
3. Mother cow's extra milk at August month
4. Culled lactating cows (50 out of 210, representing 25%).
5. Culled bulls (3 bulls)

1. Main product:

1. 200*250*16 = 800,000 LE
2. 400*450*15 = 2,700,000 LE
3. Total return of main product = 800,000 + 2,700,000 = 3,500,000 LE – 120,000 LE mortality = **3,380,000 LE**

Assumptions:

1. *Bull calves sold at 250 KG are 300*
2. *Selling price for 250 Kg bull calves is LE 16 / Kg LBW.*
3. *Selling price for 450 Kg bull calves is LE 15 / Kg LBW.*
4. *Mortality up to weaning is 5% (about 30 bull calves) at 250 Kg.*

2. By product (manure):

1. Manure of bull calves and heifers = (190+380+90)/3*12*20 = 52,800 LE
2. Manure of lactating herd and breeding bulls = (150+60+3)*12*20 = 51,120 LE
3. Total manure return = 52,800 + 51,120 = 103,920 LE

3. Extra milk yield = 150*22*60*1.25 = 247,500 LE

Note: However the extra milk is not marketing, but used for home consumption and as gifts to friends and relatives.

4. Culled cows = 50*600 KG*9LE = 270,000 LE
5. Culled bulls = 3*700 Kg*9 = 18,900 LE

Assumptions:

1. *The mature cow or bull is considered as animal unit and gives 12 cm dry manure / year.*
2. *Bull calves and heifers are considered as 1/3 animal unit.*
3. *The price for 1 M^3 of dry manure is 20 LE*
4. *The mother cows are suckling the bull calves from October to July (10 m0), and the calving interval is 14 mo, the the rest is 4 mo. Are distributed between dry and extra milk (one mo.).*
5. *Culling rate of the lactating foster mother cows is 25% annually.*

Total income:

1. Bull calves at 250 & 450 Kg = 3,380,000 LE
2. Manure = 103,920 LE
3. Extra milk = 247,500 LE
4. Culled cows = 270,000 LE
5. Culled bulls = 18,900 LE

Total = **4,020,320 LE**

Costs:

A. Variable costs:

1. Feeding
2. Machinery work
3. Energy (Electricity + Gasoline).
4. veterinary care
5. Purchasing bull calves

1. Feeding cost of 150 foster mother cows / annum

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Season	Ingredient	Quantity, KG	Price, LE/KG	Value, LE
Summer				
	Corn silage	25	0.3	7.5
	Concentrate	12	1.3	15.6
	Total			23.1
Winter				
	Clover	45	0.15	6.75
	Concentrate	12	1.3	15.6
	Total			22.35

Summer feeding cost = 150*180*23.1 = 623,700 LE

Winter feeding cost = 150*180*22.35 = 603.450 LE

Total= 623,700 LE + 603.450 LE = 1,**227,150 LE**

Assumptions:

1. *Milk production calculated as 22 Kg/d as total summer and winter average.*
2. *Lactating cow consume 3.5% DM of it's body weight (av.600 Kg) at 22 Kg milk/d distributed as 40% roughage: 60 concentrate.*
3. *Lactating cow consume 3% DM of it's body weight (av.600 Kg) at 17 Kg milk/ distributed as 60% roughage: 40Concentrate.*
4. *Average feeds market price is LE 200, LE 110, and LE 100 for corn silage, concentrate feed mixture and clover, respectively.*

2. Feeding cost of 60 dry cows / annum

Season	Ingredient	Quantity, KG	Price, LE/KG	Value, LE
Summer				
	Rice straw	3	0.1	0.30
	Corn silage	15	0.3	4.5
	Concentrate	3	1.3	3.9
	Total			8.7
Winter				
	Rice straw	3	0.1	0.30
	Clover	30	0.15	4.5
	Concentrate	3	1.3	3.9
	Total			8.7

Total = (60*180*8.7)+(60*180*8.7) = **187,920 LE**

Assumption:

Dry cow consumes 2% DM of it's body weight representing 20% conc:80% roughage.

3. Feeding cost of 570 bull calve up to 250 Kg body weight:

a. Feeding cost of bull calves on starter = (570*1.5Kg*80d*1.4LE = 95,760 LE
b. Feeding cost of bull calves on roughage and concentrate

Ingredient	Quantity, KG	Price, LE/KG	Value, LE
Wheat straw	2	0.3	0.6
Clover hay	2	0.7	1.4
Concentrate	3	1.3	3.9
Total/day			5.90

Total/100d = 570*5.9*100 = 348,100 LE

Total cost for 570 bull calves up to 250 KG =(95,760)+(348,100) = **443,860 LE**

Assumptions:

1. *Suckling period for calf is 80 days.*
2. *Starter feeding period for calf is 80 days through suckling.*
3. *Feeding on roughage and concentrates at 2.5% of body weight for 100 days up to 250 Kg weight.*
4. *Mortality rate is 5% before weaning (about 20 calves).*

4. Feeding cost of 380 bull calves fronm 250 - 450 Kg body weight:

Feeding cost / bull calf on roughage and conc. From 250 – 450 Kg

Ingredient	Quantity, KG	Price, LE/KG	Value, LE
Wheat straw	2	0.3	0.6
Clover hay	1.5	0.7	1.05
Concentrate	7	1.3	9.1
Total/day			10.75

Feeding cost on roughage and conc. = 380*10.75*180 = **735,300 LE**

Assumptions:

1. Feeding bull calves on concentrate and roughage at 2.5% of BW from 250 – 450 Kg, representing 30 roughage: 70% concentrate.
2. Average daily gain is 1.1 Kg
3. Ration requirements were calculated on average body weight of 350 Kg (initial/final*2).

5. Feeding cost of 90 replacement heifers:

Season	Ingredient	Quantity, KG	Price, LE/KG	Value, LE
Summer				
	Rice straw	1	0.1	0.1
	Corn silage	10	0.3	3.0
	Concentrate	3	1.3	3.9
	Total			7.0
Winter				
	Rice straw	1	0.1	0.1
	Clover	20	0.15	3.0
	Concentrate	3	1.3	3.9
	Total			7.0

Total feeding cost of heifers = (7.0*90*360) = **226,800 LE**

Assumptions:

Feeding heifers on concentrate and roughage at 2.25% of BW, representing 30% concentrate: 70% roughage and calculations based on 300 KG average BW.

6. Feeding cost of 3 breeding bulls:

Season	Ingredient	Quantity, KG	Price, LE/KG	Value, LE
Summer				
	Rice straw	3	0.1	0.3
	Corn silage	15	0.3	4.5
	Concentrate	2	1.3	2.6
	Total			7.4
Winter				
	Rice straw	3	0.1	0.3
	Clover	30	0.15	4.3
	Concentrate	2	1.3	2.6
	Total			7.4

Total feeding cost for breeding bulls = (3*7.4*360) = **7,992 LE**

Assumptions:
Feeding breeding bulls on concentrate and roughage at 1.5% of BW (300 KG in average)

Total feeding cost for all herd / annum:

150 Lactating cows	= 1,227,150 LE
60 dry cows	= 187,920 LE
190 bull calves up to 250 Kg	= 443,860 LE
380 bull calves up to 450 Kg	= 735,300 LE
90 heifers	= 226,800 LE
3 breeding bulls	= 7,992 LE
Total	**= 2,829,022**

2. Labor cost = 6 labor*20 LE/d*30d*12 = **43,200 LE**
3. Management cost = 3,000*12 = **36,000 LE**
4. Machinery work cost:
Loader to cut and carery the manure 8 times a year = 8*8 hrs*150 = **9600 LE**

Assumption:

1. *The cost of Loader one hour work = 150 LE.*
2. *Time allocated to finish the task is 3 hrs.*
3. *The management cost calculated as 3,000 LE for the owner manager.*

5. Energy cost:
Electricity = 1000*12 = 12.000 LE
Gasoline = 600*12 = 7,200 LE
Total cost = **19,200 LE**

6. Veterinary caree cost:
640 animal*100 LE/y = 64,000 LE
7. Purchased bull calves:
500*1300 LE = 650,000 LE
8. Repair cost = 20000 LE
9. Feed inventory estimated at 100,000 LE bank deposit and gain 10% interest rate = 10,000 LE
10. Purchased breeding bulls = 3*10,000 = 30,000 LE

Assumption:
The breeding bulls are exchanged with another breeding bull from a neighborhood farm to increase the offspring quality in the farm (Selling price = purchasing price).

Total variable costs:
Feeding (**2,829,022**) + Labor (43,200) + Management (36,000) + Machinery rent (9600)+ Energy (19,200) + Vet. caree (64,000) + Purchased animals (650,000) + repair (20,000) + Interest rate for feed inventory (10,000) + purchased bulls (30,000) = **3,709,842 LE**

B. fixed costs:

1. Buildings, equipments and machinery depreciation
2. Interest rate on variable costs

3 Depreciation and interest

Item	Initial price	Salvage price	validity Year	Depreciation rate	Interest
Truck	50,000	20,000	15	2,000	3,500
Feed mixer	30,000	10,000	15	1,300	2,000
Building	31,000	1,000	30	1,000	1,600
Total					7,100

Total fixed costs = Depreciation and interest (7,100) **= 7,100 LE**
Total cost = 3,709,842 + 7,100 = 3,716,942 LE
Revenue calculations:

1. Total variable cost = 3,709,842 LE
2. Total fixed cost = 7,100 LE
3. Total cost = 3,716,942 LE
4. Total income = 4,020,320 LE
5. Gross margin = (4 -1) = 4,020,320 - 3,709,842 = **310,478 LE**
6. Net profit = (4 – 3) = 4,020,320 - 3,716,942 = **303,378 LE**

key performance indicators (KPI's) for the current activity:

1. Return / sold bull calf = **303,378** LE/ 570 = 532 LE /year
2. Return / animal unit = **303,378** LE/ [(210)+(570+90)/2)] = 562 LE/year
3. Return / mother cow unit (lactating and dry) = **303,378** / 210 = 1,445 LE / year
4. return / land unit = **303,378** LE/ 5 = 60,675 / year

Notes:

1. *Return / sold bull calf is almost comparable to that gained through the regular beef production system in Egypt "beef dry lot" without the need to have foster mother cows, which reach in Max. 600 LE/ calf.*
2. *Return / animal unit could be useful to compare production efficiency with another beef operation depending on the investment efficiency of each animal unit, regardless the managerial or production system followed.*
3. *Return / dairy cow unit could be useful to compare between using the lactating cows as a foster mothers or lactating cows for dairy operation.*
4. *Return / land unit gives indication to the best investment comes out from the land unit in different activities (beef production, milk production, cropping, horticulture, vegetables, etc). So, the land lord can make a decision to continue on the current activity or shift to medicinal herbs production for instance.*

II. ALTERNATIVE SCENARIO NO. 1

Dairy operation with 210 lactating cows

To study if the new alternative is worth or NOT, Partial Budgeting analysis should be done to make the proper decision. To calculate the partial budgeting analysis, the following questions have to be answered:

1. The expected additional costs.
2. The expected reduced revenue.
3. The expected additional revenue.
4. The expected reduced costs.

1. Additional costs:

1.1. Constructing a new milking facilities (parlor, cooling tanks)

A 2 x 8 pts. Parlor is adequately enough to lactate 350 cows (for future expansion).

1. Expected purchasing price = 400,000 LE
2. Expected Salvage price 40,000 LE
3. Validity age = 15 years
4. depreciation rate = (400,000 – 40,000) / 10 = 36,000
5. Interest on the capital = [(400,000 + 40,000)/2] * 10% = 22,.000 LE
6. Total parlor additional cost = 36,000 + 22,000 = **58,000 LE**

1.2. Cooling tanks:

One cooling tank with 5 Tons capacity is quite enough to keep the produced amount of milk.

1. The expected price of cooling tank = 1*200,000 = 200,000 LE
2. Expected salvage price = 25,000 LE
3. Validity age = 15 years
4. Depreciation rate = (200,000 – 25,000) / 15 = 11,666 LE
5. Interest rate on the capital = [(200,000 + 25,000) / 2] *10% = 11,250 LE
6. Total cooling tank additional cost = 11,666 + 11,500 = **22, 916 LE**

1.3. Parlor building additional cost

1. The expected price of constructions = 100,000 LE
2. Expected salvage price = 5,000 LE
3. Validity age = 20 years
4. Depreciation rate = (100,000 – 5,000) / 20 = 4,750 LE
5. Interest rate on the capital = [(100,000 + 5,000) / 2] *10% = 5,250 LE
6. Total cooling tanks additional cost = 4,750 + 5,250 = **10,000 LE**

1.4. AI additional costs:

1. No. of Straw required = 210*2.5 = 525 straw + additional 75 straw as spare = 600 straws
2. Straws expected price = 600*60 LE = 36,000 LE
3. Heat detector labor cost = 400*12 = 4,800 LE
4. AI specialist cost "per task" = 525*10LE = 5,250 LE
5. Liquid nitrogen tanks often are given as pounce with straw for the first time.
6. Total AI additional cost = **46,050 LE**

Assumptions:

1. *Number of services per conception calculated as 2.5 including heifers.*
2. *Straw price is around 10$, which is almost equivalent to 60 LE*

1.5. Feeding farm calves on milk replacer instead of whole milk and up to 450 Kg:

1. Artificial suckling tools = 2,000 LE
2. Amount of milk replacer used for 100 bull calves up to 100 days = 100*100*6 = 60,000 liter = 60 Tons
3. The expected milk replacer cost = 60*1,400 = 105,000 LE
4. Total milk replacer cost = 2,000 + 105,000 = **107,000 LE**
5. feeding cost up to 450 Kg = (100*5.9*180)+(100*10.75*180) = **299,700 LE**

1.6. Feeding cost for extra milk as milk yield increased from 22 to 30 Kg /d.

1. In crease in feeding cost over 8 KG milk = 8/2 = 4 Kg concentrate diet.
2. Each animal will given 2 Kg concentrate and the rest will be substitute with 6 KG corn silage in summer and 10 Kg clover in winter.
3. Extra summer feeding cost = [(2*1.3)+(6*0.3)] *150*180= 118,800 LE
4. Extra winter feeding cost = [(2*1.3)+(10*0.15)] *150*180= 110,700 LE
5. Total extra feeding cost = 118,800 + 110,700 = **229,500 LE**

Assumptions:

1. *One Kg concentrate = 3 Kg corn silage*
2. *One Kg concentrate = 5 Kg clover*
3. *Calculation made up on 30 Kg as average milk yield and DMI consists 3.7% of BW.*

1.7. Purchasing mixer wagon:

1. Expected price = 700,000 LE
2. Salvage price 100,000 LE
3. validity age 15 year
4. Depreciation rate = (700,000 – 100,000) / 15 = 40,000 LE
5. Interest rate on the capital = [(700,000 +100,000)/2]*10% = 40,000 LE
6. Total cost of the mixer wagon = 40,000 + 40,000 **= 80,000 LE**

Total additional costs = [Parlor (58,000) + cooling tank (22,916) + buildings (10,000) + AI (46,050) + milk replacer (107,000) + extra feeding as milk increased (229,500)+ mixer wagon (80,000)] = **853,166 LE**

2. Expected reduced revenue:

2.1. Marketing 470 bull calves at different weights

1. 140 calves at 250 Kg = 140*250*16 = 560,000 LE
2. 330 calves at 450 Kg = 330*450*15 = 2,376,000 LE
3. Total = 560,000 + 2,376,000 = **2,936,000 LE**

2.2. Manure selling:

As there is no more bull calves (480), manure seals will reduce at the level of (480/3)*12*20 **= 38,400 LE**

Total expected reduced revenue = 3,325,000 + 38,400 **= 3,363,400 LE**

3. Expected additional revenue:

3.1. Milk production at 30 Kg /d /305 DIM = 210*30*305*1.6 = **3,362,625 LE**

3.2. Price of 3 breeding bulls = 3*10,000 = **30,000 LE**

Total expected additional revenue = Milk production at 30 Kg/d /305 DIM (3,074,400) + breeding bulls price (3*700*10 = 21,000) = **3,095,400 LE**

4. Expected reduced cost:

4.1. Feeding of 3 breeding bulls = 3*7.4*365 = **8,103 LE**
4.2. Purchasing cost of 500 bull calves purchased off farm = 500*1,300 = **650,000 LE**
4.3. Feeding cost of 140 bull calves up 250 KG marketing weight = **327,040 LE**
4.4. Feeding cost of 330 bull calves up 450 KG marketing weight = **638,550 LE**
Total expected reduced cost = 8,103 + 650,000 + 327,040 + 638,550 = **1,623,693 LE**

Partial Budgeting:

Additional cost		**Additional Revenue**
Parlor 58,000		Milk production 3,074,400
Cooling tanks 22,916		
Parlor buildings 10,000		Breeding bulls 30,000
AI 46,050		
Feeding on milk rep. 107,000		
Feeding for extra milk 229,500		
Mixer wagon (TMR) 80,000		
Total = 610,866 LE		Total = 3,095,400 LE
Reduced revenue		**Reduced cost**
Marketed bull calves 2,936,000		Feeding breeding bulls 8,103
Manure selling 38,400		Purchasing calves 650,000
		Calves feeding 965,590
Total = 3,363,400 LE		Total = 1,623,693 LE
(A): Total		**(B): Total**
3,974,266 LE		4,719,093 LE
	B – A = 744,827 LE	

Conclusion:
Shifting to dairy operation activity resulted in a net surplus of LE 744,827 which is 2.45 times that achieved by the current operation.

key performance indicators (KPI's) for scenario No. 1
1. Return / mother cow unit (lactating and dry) = 744,827 / 210 = 3546 LE / year
2.Total fixed cost / milk yield, Ton = 173100 / 1,922 = 90.1 LE
3. Total fixed cost /lactating herd size = 173100 / 210 = 824 LE
4. Return / land unit = 744,827 LE/ 5 = 148,965 / year

III. ALTERNATIVE SCENARIO NO. 2

Addition of more 190 lactating cows to reach the parlor full capacity.

Partial Budgeting:

Additional cost		**Additional Revenue**
Annually payment + Interest on 190 cows* = LE 691,595		Extra milk yield = LE 1.6*30*190*305 = 2781600 LE
Feeding cost for 190 lactating cows /year = (LE 26*190*305)+(LE 8.7*190*60) = 1,605,880		Bull calves 3 mo. Old = LE 1,700*90 = 153,000
Feeding 90 bull calves for 3 mo. = LE 1.4 *6*90*90 = 68,040		90 replacement heifers one year age = 90*7000 = 630,000
Feeding 90 replacement heifer for year = LE 5*90*360 = 162,000		Manure = LE 20*12*190 = 45,600
AI cost for 190 more cows = 2*60*190 = 22,800		
AI specialist = LE 2*190*10 = 3,800		
Vet. caree = LE 100*190 = 19,000		
Additional 3 parlor labors = LE 600*3*12= 21,600		
Additional cooling tank (Depr.+Interest) = LE 22,910		
Depreciation and interest of additional shaded open careol costing LE 100,000 = LE 9,333		
Total additional cost = 2,626,958		**Total revenue = 3,609,600**
Reduced revenue		**Reduced cost**
Non		Non
(A): Total		**(B): Total**
B – A = 982,642 LE		

- Future value (V) = Base value [A] [1+Interest rate (10%)^{n}]
- N= 5 year (short term bank loan; LE 2,660,000).

Key performance indicators (KPI's) for scenario No. 2

1. Return / mother cow unit (lactating and dry) = 982,642 / 400 = 2456 LE / year
2. Total fixed cost / milk yield, Ton = 259,676 / 3,660 = 70.9
3. Total fixed cost /lactating herd size = 259,676 / 400 = 649 LE
4. Return / land unit = 982,642 LE/ 5 = 196,528 / year

Farm financial situation through 5 years (Loan period):

	Year1	Year2	Year3	Year4	Year5
Purchased Cows	190	190	190	190	190
Heifers	0	95	95	95 + 45 = 140	95 + 95 = 190
Calves	0	95	95	95 + 45 = 140	95 + 95 = 190

No. of sold calves / 5 years at 300 Kg live weight = 95+95+140+140 = 520
No. of replacement heifers / 5 years = 190
No. of sold extra heifers / 5 years at 15-16 month = 520 – 190 = 330
No. of culled cows / 5 years = 190

Expected income sources through 5 years:
Bull calves at 300 Kg LBW = 520*300*14 LE = LE 2,184,000
Extra heifers at 15-16 month = 330*13,000 LE = LE 4,290,000
Culled cows as beef animal = 190* 6,000 LE = LE 1,140,000
Milk production of extra 190 cows = 190*30*1.75*305*5 = LE 15,211,875
Manure price = (520*6m3*5*20)+(330*6m3*5*20)+(190*12m3*5*20)= LE 738,000

Total income after 5 years = LE 23,563,875

Expected costs through 5 years:
Calves feeding cost = 520*5*360* LE 6.9 = LE 6,458,400
Heifers feeding cost = 330*5*360* LE 4.5 = LE 2,673,000
190 cows feeding cost through lactation periods =190*5*0.8*360* LE20=LE 5,472,000
190 cows feeding cost through dry periods = 190*5*0.2*360* LE10 = LE 684,000
AI serving and Vet. Caree cost for 190 cows =(2*60*190*5) + (50*190*5) =LE 161,500
Loan payment + interest = 797,996+744,796+691,596+638,395+585,195= LE 2,927,978

Total cost through 5 years = LE 18, 376,478

Expected revenue through 5 years = LE 18, 376,478 - LE 23,563,875 = LE 5,187,397
Expected annual revenue through 5 years = (LE 5,187,397)/5 = LE 1,037,479
Net revenue after taxation (10%) = LE 1,037,479* 0.9 = **LE 933,731**

Net revenue / net profit of the current activity = 933,731 / 388,324 = 2.41 times

Decision making:

By the end of the case, this question should be asked to the students to make a decision. What is the proper decision you have to make if you are running such agribusiness?
More additional question that student could be asked, what are the possible risks (adverse impacts) you may expect for the potential options (alternative scenarios) number I and II?