

# FEASIBILITY STUDY OF ESTABLISHING AN ARTIFICIAL INSEMINATION (AI) CENTER FOR CARABAOS IN SAN ILDEFONSO, BULACAN, PHILIPPINES

**E.Q. Arrienda II<sup>1</sup>, C.V. Cruz<sup>1</sup>, M.V. Perilla<sup>1</sup> and B.M. Setiawan<sup>2</sup>**

<sup>1</sup>*Faculty of the Department of Agribusiness Management,  
College of Economics and Management, University of the Philippines Los Banos,  
College, Laguna 4031 Philippines*

<sup>2</sup>*Faculty of Animal Agriculture, Diponegoro University,  
Tembalang Campus, Semarang 50275 - Indonesia  
Corresponding E-mail: dns\_arrienda@yahoo.com*

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## ABSTRACT

The productivity of the carabao subsector is influenced by several constraints such as social, technical, economic and policy factors. The need to enhance the local production of carabaos will help local farmers to increase their income. Thus, producing thorough breeds of carabaos and improving it genetically is the best response to these constraints. This study was conducted to present the feasibility study of establishing an Artificial Insemination (AI) Center and its planned area of operation in Brgy. San Juan, Ildefonso, Bulacan. The market, production, organizational and financial viability of operating the business would also be evaluated. This particular study will provide insights in establishing an AI Center. Included in this study is the identification of anticipated problems that could affect the business and recommendation of specific courses of action to counteract these possible problems. Primary data were obtained through interviews with key informants from the Philippine Carabao Center (PCC). To gain insights about the present status of an AI Center, interviews with the technicians of PCC and private farm were done to get additional information. Secondary data were acquired from various literatures and from San Ildefonso Municipal Office. The proposed area would be 1,500 square meters that would be allotted for the laboratory and bullpen. The AI Center will operate six days a week and will be opened from 8 AM until 5 PM. However, customers or farmers can call the technicians beyond the office hours in case of emergency. The total initial investment of Php 3,825,417.39 is needed in establishing the AI Center. The whole amount will be sourced from the owner's equity. Financial projection showed an IRR of 30% with a computed NPV of Php 2,415,597.00 and a payback period of 3.97 years. Based on all the market, technical, organizational, financial factors, projections and data analysis, it is said that this business endeavor is viable and feasible.

*Keywords: artificial insemination, carabao, feasibility study*

## INTRODUCTION

The Philippines is an agricultural country. Farming is one of the major sources of income of most Filipinos especially in the rural areas. The increase in human population and the decline of the available land for crop production is one of the major problems of all sectors in the country because this means food scarcity. Importation of major commodities will surely happen just to satisfy Filipino needs. Nonetheless, Filipino farmers are the ones who are greatly affected by these problems. Adopting new technology is one of the drawbacks in the farming system in the country. The lack of financing resources for adopting these new technologies and for

improving agricultural production is felt by most farmers in the country. Most farmers are still using the traditional method of farming which is the use of carabaos as source draft power in the field. In fact, the Philippine carabao is known as a "beast of burden" because of its contribution in the Philippine agriculture. It is also considered as one of the commodity which has a high economic value. The carabao is now utilized as a source of meat, milk and hide. The development of carabao in the Philippines shift from the conventional farming system to the organic farming system. The changes of the conventional farming to the organic farming started in early 1990. However, the changes of the farming system walked slowly to change the farmers behavior (Mendoza, 2002

and Refsgaard *et al.*, 1998). Further they explained that organic farming could increase the additional income of the farmers caused they could get the higher market price than the conventional farming.

Some researches to develop buffalo were done in some countries (see Thiruvankadan *et al.*, 2009; Erasmus *et al.*, 2000; Tiwari *et al.*, 2006; Bilal *et al.*, 2006 and Sadek *et al.*, 1998). Breeding and feeding systems were the important factors, which influence the buffalo development successfully. The study was done by Malik and Nagpaul (1999) found buffalo need 12% of crude protein (CP) in the feed ration to produce milk, they used murrah buffalo in their research. This result supported by (Hayashi *et al.*, 2005; Sadek *et al.*, 1998; Azis *et al.*, 2003 and Thu, 1997). They found almost the same results of them, the increasing of the feed quality given tend to increase the milk production of buffalo. The supplementation of molasses urea cake could increase the performance of the buffalo in Vietnam (Thu, *et al.*, 1993 and Thu *et al.*, 1996). Research was done by Ghongzen (1995) found that buffalo fed by forage and straw fermentation could increase the meat production. The productivity of the cow in India relatively was low, Average daily gain of the buffalo just 0.45 kg/head/day. Efforts to increase the productivity used the natural resources and agricultural by products (Thakur *et al.*, 2005).

Sharma *et al.* (2006) found the positive effect of the de-oiled cakes given to the lactating buffalo. The milk production showed an increasing amount after the cereal straws supplemented with higher dietary level of de-oiled cakes. The study were done by (Singh *et al.*, 2008 and Thakur *et al.*, 2005) found that some agricultural farming by product i.e. rice straw, chocolate cake meal, coffee cake meal could be processed as a feed to increase the performance of buffalo. Nha *et al.* (2008) conducted study to measure performance and efficiency buffalo based on the trait and reproduction; they found that artificial insemination (AI) was the important factor to develop buffalo in Vietnam. The performance of young buffalo could increase through Artificial Insemination (AI). This result agreed with the study of (Hamid *et al.*, 2003 and Syed *et al.*, 1996), findings the results showed performance of milk production of buffalo increased by the increasing of the traits of buffalo. Artificial Insemination (AI) could increase the quantitative and qualitative traits of buffalo.

A feasibility study of establishing an Artificial Insemination (AI) Center for Carabaos in Barangay San Juan, San Ildefonso, Bulacan will be done to assess and determine the marketing, technical, organizational and financial profitability and viability of the project. The site was chosen for the study because of its accessibility to the farmers in the municipality and other towns of Bulacan where most carabaos are being utilized. The area is also near to research institutions like the Philippine Carabao Center (PCC), where breeding materials can be acquired and to Bulacan National Agricultural State College (BNASC).

The productivity of the carabao subsector is influenced by several constraints such as social, technical, economic and policy factors. The need to enhance the local production of carabaos will help local farmers to increase their income not by using carabao as draft in the field but by making it as a source of meat, milk and hide. However, raising carabaos in the villages is regarded only as a source of draft and only secondarily as a source of income. This farmer's practice has a major impact on the management and overall development of carabao. Moreover, farmers find it more convenient to maintain their hand tractors than to take care of a draft animal throughout the year because the period when animals are actively used in the field is shorter than the time the animal is at rest. However, those farmers whose animals have higher capability to produce milk generate substantial cash income in the form of daily sales of milk. The development of carabao as a source of milk for the household and community is feasible if the industry can stimulate local milk production and make products out of it, at the same time, can compete with the low-cost imported milk.

Raising carabao as a source of income is influenced by its relative profitability. Carabao meat is priced lower compared to cattle meat because the large percentage of carabaos sent to the meat market consists of old and retired draft animals. Given the above condition, some farmers raise and sell their carabaos at a younger age for meat. These farmers are penalized by the government and are one of the issues in the carabao subsector. In addition, the availability of low-cost carabeef from India gives the local market the option to import meat. Given these constraints and problems, a need to improve the carabao subsector is a great challenge to all farmers, to the government and to the country as a

whole. Producing thorough reeds of carabaos and improving it genetically is what the research focused on.

This study focused primarily on determining the feasibility of establishing an Artificial Insemination (AI) Center for Carabaos in San Ildefonso, Bulacan. Specifically, it aimed to: (1) present the details of an artificial insemination (AI) center and its planned area of operation, (2) determine the market, production, organizational and financial viability of operating the business in San Ildefonso, Bulacan and (3) recommend specific courses of action based on the findings of the study.

## MATERIALS AND METHODS

### Method of Data Collection

Primary data regarding the production, marketing and operation of an artificial insemination (AI) center were through actual and direct interviews and observations from private and government agencies that provide artificial insemination for carabaos, and insights about productive and efficient operations and management of AI center. Questionnaires were provided to serve as guide for the interview. These interviews help the researcher in determining the problems encountered by the existing breeding centers. The identification of specific problems was used in finding solutions so that same problems could be minimized. Likewise, an estimate of the costs in establishing an AI center was gathered. Other relevant costs were obtained by conducting personal interviews to existing breeding centers and government institutions that provide such services like the Philippine Carabao

Center (PCC).

The required prices for initial investment were obtained through the PCC in UPLB, and also from the existing breeding centers in the country. Facilities, equipment and breeding apparatus and resources needed were determined through interviews from existing private breeding centers and government agencies.

The PCC was the primary source of secondary data for this study. Additional data were gathered from journals, books, magazines and statistical reports. These data were obtained from private and government institutions such as the main library of UPLB, UPLB College of economics (CEM) library, UPLB CVM/ DTRI/ ADSC library, and Philippine Council for Agriculture Resources Research and Development (PCARRD).

### Research Instrument Used

Guide questionnaires were prepared to facilitate interviews with technicians from the existing breeding centers regarding their production, operations, marketing and also the problems encountered since they entered in business. Questionnaires were also prepared for farmers, who had adopted the AI technology.

### Method of Data Analysis

The study employed both primary and secondary data. The data collected were analyzed using the quantitative and qualitative tools. The four functional areas of business management namely, marketing, production, personnel and finance were made to check the viability of such investment. Interviews to private and government agencies were done to assess the overall

Table 1. Projected Income Statement (Base Case)

Sales	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Frozen Semen	1800000	1800000	1800000	1800000	1800000	1800000
AI Services	500000	500000	500000	500000	500000	500000
Total sales	2300000	2300000	2300000	2300000	2300000	2300000
<i>Operating expenses</i>						
A. Cost of Animal Maintenance	120187.86	120187.86	120187.86	120187.86	120187.86	120187.86
B. Cost of Chemicals, etc.	159454.53	159454.53	159454.53	159454.53	159454.53	159454.53
C. Cost of Labor	220800	220800	220800	220800	220800	220800
D. Cost of other supplies	24400	24400	24400	24400	24400	24400
E. Depreciation Cost	158873.33	158873.33	158873.33	158873.33	158873.33	158873.33
Total operating Expenses	683715.72	683715.72	683715.72	683715.72	683715.72	683715.72
Taxable Income	1616284.28	1616284.28	1616284.28	1616284.28	1616284.28	1616284.28
Less: tax	482210.97	482210.97	482210.97	482210.97	482210.97	482210.97
Net income after tax	1134073.31	1134073.31	1134073.31	1134073.31	1134073.31	1134073.31

Table 2. Projected Cash Flow (Base Case)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>CASH INFLOW</b>						
Total Sales	2300000	2300000	2300000	2300000	2300000	2300000
Total Cash Inflow	2300000	2300000	2300000	2300000	2300000	2300000
<b>CASH OUTFLOW</b>						
A. Cost of Animal Maintenance	120187.86	120187.86	120187.86	120187.86	120187.86	120187.86
B. Cost of Chemicals, etc	159454.53	159454.53	159454.53	159454.53	159454.53	159454.53
C. Cost of Labor	220800	220800	220800	220800	220800	220800
D. Cost of other supplies	24400	24400	24400	24400	24400	24400
E. Tax	482210.97	482210.97	482210.97	482210.97	482210.97	482210.97
Total Cash Outflow	1007053.36	1007053.36	1007053.36	1007053.36	1007053.36	1007053.36
<b>NET CASH FLOW</b>	<b>1292946.64</b>	<b>1292946.64</b>	<b>1292946.64</b>	<b>1292946.64</b>	<b>1292946.64</b>	<b>1292946.64</b>
NPV = Php 2,415,597.34						
IRR = 30%						
Payback Period = 3.97 years						

performance of an AI Center. Financial feasibility of the project was determined using the financial status indicators such as Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period (PP). The proposed project was also subjected to sensitivity analysis. The NPV, IRR, and PP used Moll and Igual method (2006), Estimation of the Benefit and cost used the Secondary data. Secondary data were used to compute the estimation of benefit and cost. The value of IRR, NPV, and PP were expected have the high value, hence the projects were feasible.

## RESULTS AND DISCUSSION

Artificial insemination or AI is the process of impregnating carabaos through the use of semen collected from superior bulls. The sperm is deposited to the female organ through the use of an instrument. The process involved the selection of the best breeder bull as semen donor, semen collection and processing, storage and use. Artificial insemination in the Philippines was introduced in the 1950's, at the same time that it was being widely and commercially used in the developed countries. The method was already recognized as a key instrument for the development of livestock because its use fits in a local breeding program where continuous upgrading of the local or indigenous stock using semen from imported (often improved) breeds were being used.

The utilization of artificial insemination maximizes the use of outstanding breeder bulls (sires) to produce more offspring. It is an

economical means of enhancing the genetic potential for economic traits of carabaos. If the bull has been progeny tested, the genetic gain, as well as profit from the herd, is increased. AI facilities testing of offspring as potential breeders and it permits crossbreeding of local female animals with exotic breeds without importing males. Spreading of diseases especially sexually transmitted ones can be prevented or minimized which can be transmitted by the bull in a natural service.

A lot of studies showed that using AI costs less per serviced than maintaining a really meritorious sire in which need investment. Syed *et al.* (1996) explained artificial insemination (AI) effective to improve the breed quality of buffalo. The improvement of the breed leads to increase the production of the milk of buffalo.

## OPERATIONS

The base scenario was prepared with initial assumption that the AI Center will produce 10,000 straws of frozen semen from six Buffaloes or 1.2 million liters of semen annually for ten years. The frequency of collection was twice a week. The AI Center can produce 39 straws of frozen semen per week or 2,016 straws per year. It is assumed that 60% of the 10,000 straw of frozen semen will be sold all over the Philippines and 20% of the 10,000 straw will be serviced by the AI Center's technicians. The price of the frozen semen was Php 300.00 (US \$6.43) while service fee was Php500.00 (US \$10.72). Operating costs were constant all through out the project's

economic life.

The base scenario will serve as the reference point for the evaluation of the critical factors that will affect the viability of the business. The projected income and cash flow statements are presented in the Table 1 and Table 2. The project has a computed NPV of Php 2,415,597.34 (US \$51,809.06). This value indicates that the project will earn a positive return. More so, the project's IRR is high compared to its required rate of return that is equal to 14%. The project's computed IRR is 30%. Furthermore, the project has a payback period of 3.97 years thus the project will recover the initial investment not less than four years.

### Sensitivity Analysis

Sensitivity analysis was done to determine the responsiveness of the project's viability to the different possible scenarios. These scenarios involved changes in the product's price and operational expenses such as materials and inputs and volume of production. NPV and IRR were used as basis of the financial viability of the project.

#### Scenario 1

- There will be a 17% decreased in the sales of frozen semen, and 50% decrease in AI services.
- The price for frozen semen and service fee remains the same.
- The operating costs are constant throughout the ten year economic life of the project.

Under scenario 1, the project showed favorable IRR and NPV. NPV is Php 689,025.93 (US \$14,778.04) while IRR is 19%. Payback period is 4.08 years. Given these conditions, the NPV showed positive, and the IRR exceeded the required rate of return, thus, the project is acceptable.

#### Scenario 2

- The semen collection remains the same; with production volume of 10,000 frozen semen that is done twice a week annually.
- The labor cost increased by 3% every year.
- The costs of maintenance, chemicals other supplies increased by 5% every three years.

Under scenario 2, the project is still favorable. It obtained an IRR of 29% and a positive NPV of Php 2,253,488.96 (US\$48,332.20). From these results it is worthy to

note that the project is worth investing. Furthermore, the initial investment will be covered in 3.04 years.

#### Scenario 3

- There will be a 17% decreased in the sales of frozen semen, and a 50% decrease in AI services.
- The labor cost increased by 3% every year.
- The costs of maintenance, chemicals and other supplies increased by 5% every three years.

In Scenario 3, the project is not acceptable because the computed IRR is lower than the discounted rate. The third scenario gave positive income over the ten-year project life. However, projected cash flows are negative; the computed NPV is -Php 263,098.96 (-US \$5,642.87). The IRR is 12% which is lower than the discounted rate. The project will recover its initial investment on 5.10 years as evident in the computed payback period. This result supported by Moll and Igual (2006), they recommended that projects should generate IRR higher than the alternative discount rate applied. The IRR of the project in scenario 3 was lower than IRR recommended by Moll and Igual (2006). They recommended every agricultural project should get an IRR at least 16% on average, because the project in agricultural sector has a high risk and uncertainty.

### BUSINESS ANALYSIS OF POTENTIAL RISKS AND PROBLEMS

In establishing a business, risks and problems are expected. In establishing an Artificial Insemination (AI) Center, there are risks and problems that can be encountered especially in marketing the product which is the processed frozen semen. The financial analysis showed that the business is feasible under some conditions. This is evident in the projected income statement and cash flows under different scenarios and the computed NPV and IRR. However, that does not ensure that the project will be successful. There are other aspects of the business that should be taken into consideration.

#### Marketing

Even though the financial analysis showed that the business will be profitable, marketing the product is very critical. This is because the business is new and it has to establish its name in

the market first. Although there are no breeding stations in the town of San Ildefonso, the population of the carabao in the area is relatively small. So the AI center is not only cater its product and services in the town but also in the whole province of Bulacan, in Region Three, and the whole country as well. Tapping the population of carabaos in the country is the major problem of the center. It was shown in the sensitivity analysis that the business should ensure a constant volume of production otherwise; the project will be useless, as it will just incur losses from its operation.

### **Production**

The main risk in the production aspect of the business is the bulls from where the frozen semen are gathered and then processed. If something bad will happen to the bulls, the AI center cannot produce frozen semen which is the main source of income of the business. Pest and diseases are also possible problems. If the bulls are infected by certain pest or diseases, the technicians cannot use them for semen collection and processing. The business is risky because source of income comes from the sales of frozen semen and the service charge/fee for the technicians. Furthermore, pest and diseases could increase the operating costs of the company which would also result to a decrease in the project's profit.

### **Personnel**

The problem that could be encountered in the personnel department is the tardiness of the technicians and laborers. If the laborers will not give proper attention or will not take good care of the bulls, there will be a tendency that the bull might get sick and eventually die. Moreover, if the technicians are tardy in processing semen and giving AI services to the farmers, service charge/fee will decreased which in turn, also decrease the income of the business since sources of income comes from frozen semen straw and in the service charge/fee.

## **CONCLUSION**

The establishment of an Artificial Insemination (AI) Center in San Ildefonso, Bulacan proved to be feasible under some scenarios. This is evident in the computed values of NPV and IRR given three scenarios. Pursuing the project is recommended but it could be risky. The following are suggested to solve the possible

problems of the business:

### **Marketing**

The AI Center should devise innovative and intense promotion and marketing such as advertisement of the product and the services. Advertisements could be in print ads, so to promote the product and services. The AI center should coordinate to the municipal government and other agricultural institutions in Bulacan and in the country to promote the use of Artificial Insemination and to endorse the AI center to the government.

### **Production**

Taking good care of the bulls by properly giving feeds, veterinary medicines and other vitamins and supplements are the best way to improve the production yields as well as to get rid of pests and diseases. Production of semen should be monitored by the manager and the technicians so as to avoid overproduction. The business should also keep itself updated of the latest information about semen production and any new technology or processing techniques for AI production. Knowing the latest technology will make the business more efficient in producing frozen semen and in giving its customers high quality services. Moreover, to maximize the production area, it is recommended that the AI center will venture into semen processing of cattle since the process and the technology to be used is just the same. This will add additional revenue for the AI Center.

### **Personnel**

The laborers and the technicians should not be neglected since they are the major workforce in the AI Center. Their poor performance could adversely affect the overall production and business operation. Reward system such as bonuses should be employed to motivate the employees to work better. Moreover, performance evaluation should be done every month so to account the employees performance. This will be the basis if the laborers or technicians will be given benefits, or if they will be terminated because of poor work performance such as tardiness and absenteeism. In general, establishing an Artificial Insemination (AI) Center in San Ildefonso, Bulacan is feasible. Marketing should be given much importance for the business to survive. Profit is not the sole basis of the success of the business. Achieving the business goals and

objectives make the business a successful one.

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