DAIRY SECTOR INVESTMENT OPPORTUNITY BRIEF

Artificial Insemination Service

1. Executive Summary

This dairy sector investment opportunity brief highlights the establishment of Artificial Insemination service. The Artificial Insemination service is assumed to distribute 33,525 dozen of Conventional, Local and Sexed Semen.

The Total Investment requirement is estimated at approximately $ 58,800, out of which $ 2,564 is required for the Office Furniture and Equipment, $ 20,000 is for Purchasing 5 Motor Cycles and $ 36,236 is for Working Capital. The AI service will create employment opportunities for 9 individuals.

The Project is financially viable with an average annual net profit of five years $ 39752, an average net profit margin of 17%, a ten-year internal rate of return (IRR) of 68% and NPV will be $308,161.

2. Service Description

Artificial Insemination (AI) is a procedure that involves the collection of sperm from a male bull, which is then processed, stored, and artificially introduced into the female reproductive tract for the purpose of conception (Webb, 2003). The semen collected from the bull is deep-frozen and stored in a container with Liquid Nitrogen at a temperature of minus 196o and made for use (Desalegn, 2009). AI makes available bulls of high genetic merit allowing breed improvement to take place much more quickly than with natural mating. The process also lessens the risk of transfer of disease because there is no direct contact between the bull and the cow (P.H. Bayemi, 2012). Exotic blood of 50% is more advisable at a smallholder level, but in some cases, up to 75% exotic blood might be economical depending on the farm condition (Aynalem et al).

The Semen produced will be packed in straws of different size, long medium and mini in which the size determines the amount of semen it contains depending on the concentration of the sperm. Every insemination dose should contain at least 15-40 million sperms. Finally the semen will be transferred to a long-term preservation in the main storage tank in liquid nitrogen at -196^{o}C until it is distributed.

Thus, the purpose of establishing AI service for cattle breeding is to;

- Make best use of genetically superior bulls;
- Reduce the cost or the hazard of rearing breeding bulls;
- Control the spread of infections reproductive diseases;
- Create job opportunity;
- Support the ongoing effort in milk production in the city;
- Bring rapid improvement in the quality of cattle; and
- Let the farmers have the opportunity to use bulls with proven performance, which otherwise they could not afford.

3. Market Background

AI service provision requires adequate financial resources, technical skills and sound planning. In Ethiopia, it has long been the sole responsibility of the public sector. In many developing countries, numerous projects have been introduced to establish and develop AI services delivery system. While establishing facilities for the production and storage of semen is reasonably feasible anywhere, it is far more difficult to implement and efficiently maintain field AI service activities.

This holds true to the Ethiopian past experiences. It is believed that the involvement of the private sector in collaboration with other relevant development partners improves the situation and can bring cattle genetic improvement and later on other livestock species of the country.

AI service provision in Ethiopia has long years of experience and have been started in 1938. However, the productivity of local dairy cows is very limited; an average of 1.5 liters per day for a maximum of 6 months annually. Cross breeding the local cattle with foreign cattle with much better productivity is essential to enhance dairy productivity. Although the Ethiopian government has been providing AI services for over 40 years, the effectiveness of the program is almost zero as after 40 years of operations as only less than 2% of the cattle population is of a mixed or improved variety breed.

According to a study conducted by Land O'Lakes in 2011, twelve AI service providers make up the industry, of which six businesses are private companies and the remaining six are private AI technicians. AI service is mainly being provided by the National Artificial Insemination Center (NAIC) established under MOA for the production and distribution of semen and liquid nitrogen based on the request of regional agricultural development bureaus. NAIC supplies its products and services to farmers at a highly subsidized rate that is ETB4 per dose of semen and ETB 15 per insemination.

NAIC, established under the Ministry of Agriculture (MoA) in 1976 E.C., is the main provider of AI services. It produces and distributes semen and liquid nitrogen based on the requests of regions. The center maintains bulls of 50% and 75% of Friesian and Jersey, crossed with indigenous cattle of Ethiopian Boran, Arsi, Begait, Fogera and Horro. NAIC also keeps pure breed of Friesian and Jersey. The service is provided at a highly subsidized rate; a dose of semen is sold at 4 ETB and AI service is provided at 15 ETB only.

4. Major Competitors

As mentioned earlier, the government is one of the major competitors of the company and there are also individual AI technicians that are providing the service by themselves. At this time, National Artificial Insemination Center (NAIC) is the only government institution that is providing this service almost for free and also small number of individual AI technicians located in Addis Ababa, Bahir Dar and Gondar that are providing the service that could potentially be the competitors.

And also, ALPPIS is the only private AI service provider in the country and is also the only importer and distributor of quality semen (female sexed and unsexed), field AI equipment, including liquid

nitrogen, liquid nitrogen containers, consumables and veterinary drugs. The company provides advisory/consultancy services and trainings to AI technicians, farmers and development workers on management and improvement of livestock productivity, conducts monitoring and evaluation activities.

5. Contributions for the Sector

Smallholder farmers in high potential dairy areas usually use local cows with low productivity and reproduction efficiencies. In addition, the farmers generally follow a traditional system where there is no appropriate heat detection method; low quality genetic material when AI is practiced; poor AI service by extension agents; and shortage of liquid nitrogen and related AI equipment. Irrespective of their proximity to the big milk market in Addis Ababa and other major cities, the farmers that are located in the selected areas are not fully benefiting from their dairy farms. Therefore, the AI service will support smallholder farmers and private commercial farms in upgrading the genetics of the existing indigenous and crossbred dairy cows with genetically superior and proven semen. Additionally the AI service will be able to deliver the high quality semen and full-fledged AI service in a timely manner.

This will significantly contribute to the increase of their milk production. The AI service provided will not only be insemination but it will also include intensive follow ups, data collection, monitoring and evaluation which are not being practiced by the public AI service provider.Therefore, the main purpose of the project will be increasing milk production through genetic improvement and thus improve the lifestyle and increase income of farmers from increased milk production.

6. Potential Customers

The current untouched market potential for AI service in the country is about 52,910,260 due to the fact that 98% of the total cattle population (53,990,061) in Ethiopia is indigenous that needs to be inseminated for a better productivity.

The company will penetrate to the different areas of the country including Amhara, Tigray, Oromia and SNNPR where high potential of cattle population is found. According to 2012/13 CSA data, there are 288,465 milking cows in Amhara, 49,180 in Tigray, 2,661,194 in Oromia and 3,282,414 in SNNPR regions respectively. So, it is estimated that the potential customers will be more than 50% of the breed-able cattle population in the regions as there is high demand for AI service by farmers in all regions of the country.

Table 1**:**-Number of Milking Cows in Four High Potential Regions

Regions	**Milking Cows***
Amhara	288,465
Tigray	49,180
Oromia	2,661,194
SNNPR	3,282,414
Total	**6,281,253**

Source*:* CSA data

*Milking Cow: Refers to cows actually milked during the year, Nov 11, 2011 to Nov 10, 2012

7. Suppliers of Acquiring the Products

The company will mainly sources its semen from a USA, Europe, Israel and Canada. In addition, AI equipment including liquid nitrogen containers, insemination gun, AI gloves, Sheath and other equipment will be source from Pakistan

8. Staffing

The total human resource required for the envisaged plant is 9 persons. The estimated annual salary requirement is anticipated to be $ 6,246.

9. Environmental Risks

The Company should not use any chemical that can cause environmental problems by itself. The Semen and liquid nitrogen transportation from one place to another requires separate and reliable transportation system. The fragile semen and Liquid Nitrogen, where the semen is stored in a container is very dangerous for human being due to its very cold temperature (below -196^{0}C)

10. Financial Assumption

The financial model of the project is based on the following assumptions:

- **Total Initial Investment Cost**

The total investment cost of the project including working capital is estimated to be $58,800. The following table summarizes the total investment cost breakdown;

Sr. No.	Cost Items	Qty	Unit Cost (USD)	Total Cost (USD)
1	Office Furniture and Equipment		2,564	2,564
2	Motor Cycle	5	4,000	20,000
3	Working Capital		36,236	36,236
	Total Investment cost		**42,800**	**58,800**

Financial Analysis

Based on the projected financial statement, the project will generate profit throughout the projected period (10 years). Annual average net profit after tax is projected to be $ 39752 with average margin of 17%. The EBITDA margin is expected to be 22 %. The IRR of the project will be 68%, indicating the financial viability of the business the payback period of the project is 2.3 years. The NPV, at a 10% discount rate, is expected to be $308,161.

Projected Income Statement

Description	Project Years									
	1	2	3	4	5	6	7	8	9	10
Sales Revenue	**188,372**	**207,210**	**227,930**	**250,724**	**275,796**	**303,375**	**333,713**	**367,084**	**403,793**	**444,172**
Operating Costs:										
Raw Material Cost	144,943	152,190	159,800	167,790	176,179	184,988	194,238	203,949	214,147	224,854
Wages and Salaries	6,246	6,871	7,558	8,314	9,145	10,059	11,065	12,172	13,389	14,728
Office Supplies (Stationery)	615	646	678	712	748	785	825	866	909	955
Office Rent	3,692	3,692	4,246	4,246	4,246	4,883	4,883	5,616	5,616	5,616
Utility	615	646	678	712	748	785	825	866	909	955
Fuel, Lubricant & Maintenance	431	452	475	499	524	550	577	606	636	668
Marketing Cost	1,026	1,077	1,131	1,187	1,247	1,309	1,374	1,443	1,515	1,591
Miscellaneous	2,564	2,692	2,827	2,968	3,117	3,273	3,436	3,608	3,788	3,978
Total Operating Costs	**160,133**	**168,267**	**177,393**	**186,429**	**195,953**	**206,633**	**217,223**	**229,126**	**240,910**	**253,344**
NP BTIDA	28,239	38,942	50,537	64,295	79,843	96,743	116,490	137,958	162,883	190,828
Less: Depreciation & Amortization	4,513	4,513	4,513	4,513	4,513	4,964	4,964	4,964	4,964	4,964
Profit Before Income tax	23,727	34,430	46,024	59,782	75,330	91,779	111,526	132,994	157,918	185,864
Less: Income tax				17,934.66	22,598.92	27,534	33,458	39,898	47,376	55,759
Net Profit	**23,727**	**34,430**	**46,024**	**41,848**	**52,731**	**64,245**	**78,068**	**93,096**	**110,543**	**130,104**
Profit Margin	13%	17%	20%	17%	19%	21%	23%	25%	27%	29%

Projected Cash flow Statement

Description	Project Years										
	0	1	2	3	4	5	6	7	8	9	10
Cash Inflows											
Owner's Equity	58,800										
Bank Loan											
Net Profit		23,727	34,430	46,024	41,848	52,731	64,245	78,068	93,096	110,543	130,104
Total Accumulated Depreciation		4,513	4,513	4,513	4,513	4,513	4,964	4,964	4,964	4,964	4,964
Total Cash Inflows	**58,800**	**28,239**	**38,942**	**50,537**	**46,360**	**57,244**	**69,209**	**83,032**	**98,060**	**115,507**	**135,069**
Cash Outflows											
Inv'ment on Fix. Assets	22,564										
Working Capital	36,236	-	1,812	1,902	1,997	2,097	2,202	2,312	2,428	2,549	2,677
Replacement						24,821	-	-	-	-	-
Dividend (30%)		7,118	10,329	13,807	12,554	15,819	19,273	23,420	27,929	33,163	39,031
Total Cash Outflows	**58,800**	**7,118**	**12,141**	**15,710**	**14,552**	**42,737**	**21,476**	**25,733**	**30,357**	**35,712**	**41,708**
Net Cash Flow	**-**	**21,121**	**26,802**	**34,828**	**31,809**	**14,507**	**47,733**	**57,299**	**67,703**	**79,795**	**93,360**
Cum. Cash Balance	**-**	**21,121**	**47,923**	**82,751**	**114,559**	**129,066**	**176,799**	**234,098**	**301,802**	**381,597**	**474,957**