EXHIBIT HH 9

AFFIDAVIT & ANNEXURES

OF

DAVID ANDREAS MAREE

JUDICIAL COMMISSION OF INQUIRY INTO ALLEGATIONS OF STATE CAPTURE, CORRUPTION AND FRAUD IN THE PUBLIC SECTOR INCLUDING ORGANS OF STATE

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INDEX: EXHIBIT HH 9

IN THE COMMISSION OF INQUIRY INTO ALLEGATIONS OF STATE CAPTURE, CORRUPTION AND FRAUD IN THE PUBLIC SECTOR INCLUDING ORGANS OF STATE ("THE COMMISSION")

AN INVESTIGATION INTO THE VREDE DAIRY PROJECT

SWORN AFFIDAVIT

I, the undersigned,

DAVID ANDREAS MAREE

hereby declare under oath as follows:

1. I am a major male agricultural economist currently employed at First National Bank, WesBank Building, Enterprise Road, Fairlands, Johannesburg.

2. The content of this affidavit is true and correct and falls within my own personal knowledge, unless the contrary clearly appears from the context or is otherwise stated.

3. I have been approached by investigators associated to the Commission of Inquiry into Allegations of State Capture, Fraud and Corruption in the Public Sector and certain Organs of State ("the Commission") to provide information as to my knowledge relating to Estina (Pty) Ltd (Registration No. 2008/015033/07) ("Estina") and the Vrede Integrated Dairy Project.

4. In this regard and during or about November 2013 I was approached by a certain Suad Jacobs from ENS Africa, who had been mandated to undertake an investigation into the Vrede Integrated Dairy Project, and for purposes of

D.A.M.

obtaining a report from me as to the viability of the Vrede Integrated Dairy Project.

5. In order to demonstrate my unique expertise in the subject matter, I attach hereto a copy of my curriculum vitae as annexure "**CM1**".

6. I was duly mandated to undertake an investigation and was provided certain documentation including but not limited to the project proposal, the business plan, and the feasibility study. These documents are annexed to my report, as referred to below.

7. My terms of reference were to review the documents and determine:

7.1 The reasonableness of the costs quoted in the documents;

7.2 Whether there was/would be any benefit for government in the project, in other words value for money invested or spent;

7.3 Any other concerns regarding the feasibility or sustainability of the project.

8. I, in terms of the mandate provided, conducted my investigation, and compiled a report, a copy of which is attached hereto as annexure "**CM2**".

9. This report was presented to Ms Suad Jacobs of ENS Africa.

10. This is all I wish to declare at this stage.

DAM-003

D.A. Maree.
DEPONENT

Signed and sworn before me at Garsfontein this 17 day of July 2019 after the deponent declared that the deponent is familiar with the contents of this statement and regards the prescribed oath as binding on the deponent's conscience and has no objection against taking the said prescribed oath. There has been compliance with the requirements of the Regulations contained in Government Gazette R1258, dated 21 July 1972 (as amended).

COMMISSIONER OF OATHS:

FULL NAMES: Mmoonapho Mahlaba

CAPACITY: W/o

ADDRESS: 2114 Anthony Classen
Garsfontein
Pretoria

SOUTH AFRICAN POLICE SERVICE
GARSFONTEIN
2019 -07- 17
COMMUNITY SERVICE CENTRE
SUID-AFRIKAANSE POLISIEDIENS

COMMISSION OF INQUIRY INTO STATE CAPTURE

D.A.M.

Curriculum Vitae

Dawie Maree

- **B Sc (Agric) Agricultural Economics**

University of Pretoria

- **Master in Management (MBA)**

University of Antwerp Management School, Antwerp – Belgium

- **M Sc (Agric) Agricultural Economics**

University of Pretoria

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D.a.M.

PERSONAL DETAILS – DAWIE MAREE		
Surname	:	Maree
Full name	:	David Andreas
I.D. number	:	771108 5112 089
Date of birth	:	8 November 1977
Sex	:	Male
Marital status	:	Married
Driver's licence	:	Code EB, own reliable transport
Nationality	:	South African
Language	:	Afrikaans
		English
		Flemish, Dutch
Criminal infringements	:	None
Health	:	Excellent
Sport	:	Long distance running
Hobbies	:	Camping and Hiking
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Addresses		
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D.A.M.

EDUCATIONAL QUALIFICATIONS		
School	:	Ventersdorp High School, 1995
Highest standard passed	:	Matriculated with university exemption
Subjects	:	Afrikaans, English, Accounting, Mathematics, Science, Geography and Business Economics
Leadership roles	:	Deputy-Head Boy (school) and Head Boy (Hostel)
and awards	:	Gold Medal for excellent school-career, Academic colours Standard 6 to Standard 10 Best Cadet, 1992

TERTIARY EDUCATION		
1) Institution	:	**University of Pretoria, Pretoria**
Degree	:	**B.Sc. (Agric) Agricultural Economics – 2000**
Major subjects passed	:	Agricultural Economics Agricultural Extension (distinction) Financial Management (distinction) Agricultural marketing Economics
Computer literacy	:	Excellent knowledge of Microsoft Office, with extra theoretical knowledge of risk and statistical computer programmes

2) Institution	:	**University of Antwerp Management School, Antwerp, Belgium**
Degree	:	**Master in Management, Cum Laude – 2001-2002** Master in Business Management (MBA), as evaluated by SAQA (see attached certificate)
Major subjects passed	:	Management Decision-supporting techniques Financial Management Production and Operational Management International Businesses

3) Institution	:	**University of Pretoria, Pretoria**
Degree	:	**M.Sc. (Agric) Agricultural Economics – 2007**
Subjects passed	:	Strategic Management Agricultural Marketing Agricultural Finance Econometrics
Thesis-subject	:	Development of different technical, economic and financial benchmarks as management tool for intensive milk producers on the Highveld of South Africa

EMPLOYMENT HISTORY

1) Feb 2015 – Current	:	Head: Information and Marketing at FNB Business, Agriculture. In this position I am responsible for all the below-the-line marketing of the agriculture division of FNB Business, which include speaking at events on agricultural related topics. In this regard, and from my previous experience, I've established a wide network with industry rolepalyers. With regards to information, I am responsible for the sign-off on all reports generated by the team to ensure that information, both in and outside of the Bank, is correct and relevant.
2) April 2009 – January 2015:		Employed as the senior economist of Agri SA, the biggest agricultural union in South Africa. In this position I represent Agri SA on various forums such as the Agricultural Trade Forum, the National Disaster Management Advisory Forum. I also represent Agri SA in BUSA's activities dealing with issues that affect farmers directly. Responsibilities include analyzing economic data and statistics in order to assist policy development.
3) Nov 2004 – March 2009	:	Employed as agricultural economist and Manager: Regional Services at the Milk Producers Organization. I was responsible for the gathering and analyzing of statistics, especially on production costs. Managerial responsibilities included the general management function for the regions of the Milk Producers' Organisation, including budgeting and financial management.

4) Aug 2003 – October 2004	:	Employed at HG Grain marketing in Delmas as agricultural economist. Major duties were to assist farmers in risk and price management, prod uction planning, research and distribution of relevant information to role-players in the market.
5) Sep 2003 – Feb 2004	:	Contractual consulting for Cotton SA on the economic impact analysis of the cotton industry in South Africa.
6) Feb 1999 – Nov 2000	:	Research assistant at the Department of Agricultural Economics, Extension and Rural Development – University of Pretoria

PAPERS AND PUBLICATIONS

1) ***The Critical Aspects of the Supply Chain for Marula Yoghurt***
   - Dawie Maree and Tobias Doyer
   - Paper presented at the Marula Workshop – 14 February 2001

2) ***Inwonersenquête Regionaal Ziekenhuis Sint Trudo***
   - Bart van Zele and Dawie Maree
   - Thesis as part for the fulfilment for the degree Master in Management, University of Antwerp Management School – June 2002

3) **An Investigation into the Zambian Dairy Industry**
   - Koos Coetzee and Dawie Maree
   - Report prepared for the Zambian Milk Processors Organisation, July 2005

4) ***The Dairy Mail***
   - Various articles written for *The Dairy Mail* – 2004-2008

5) ***Lacto Data***
   - Co-author of Lacto Data (Statistics for the South African dairy industry)

6) **Development of different technical, economic and financial benchmarks as management tool for intensive milk producers on the Highveld of South Africa**
   - Thesis as part for the fulfilment for the degree M SC (Agric) Agricultural Economics, University of Pretoria, 2007

7) **Benchmarking a intensive dairy herd**
   - Paper presented at the Annual General Meeting and Congress of the National Association of Dairy Farmers of Zimbabwe, June 2007

8) **Development of different technical, economic and financial benchmarks as management tool for intensive milk producers on the Highveld of South Africa**
   - Poster paper presented at the International Farm Comparison Network Conference, Kiel, Germany, June 2008

9) ***Agri* (Agri SA's magazine)**
   - Various articles written for *Agri* – 2009-2014 on various topics

D.A.M.

10) ***Other***

- Various articles written for various magazines
- Numerous press releases published by FNB Corporate Communications on agricultural related issues.
- Numerous radio and TV interviews as a result of the above-mentioned press releases.

REFERENCES

1) Francois Marais
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Head of Agriculture
087 328 0292 or afmarais@fnb.co.za

2) Johan Pienaar
Agri SA
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3) Dr Koos Coetzee
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Review of Vrede Integrated Dairy Project

Commissioned by ENS Forensics

Dawie Maree

December 2013

Contents

Tables

Annexures

089-1075-0001-0462

COMMISSION OF INQUIRY INTO STATE CAPTURE

1 INTRODUCTION

1.1 Overview of the project

The Vrede Integrated Dairy project, which is reviewed in this report, is a large-scale integrated commercial agribusiness which is envisaged at Vrede in the Thabo Mafutsanyana District Municipality in the Free State Province. The objectives of the project are outlined include the following:

- To utilise the existing natural and other resources to create a viable large-scale agro-industrial enterprise,
- To improve the food security situation for a number of rural communities,
- To create a number of small enterprises, and
- To alleviate poverty in the surrounding communities.

In the short term the milk will be procured from in-house rearing and milking of cows. Milk will also be processed in-house. It is planned that the operation will expand gradually to include other local farmers over the long term. It is also foreseen that the dairy project will offer nearby crop producers with an opportunity to an alternative market for their products.

1.2 Problem Statement

ENS Forensics (Pty) Ltd (ENS) commissioned an independent review of three documents pertaining to the integrated dairy project; the three documents to be reviewed were:

- Project Proposal
- Business Plan
- Feasibility Study

The terms of reference were to review the documents to determine:

- the reasonableness of the costs quoted in the documents
- whether there was/would be any benefit for government in the project – thus value for money spent/invested
- any other concerns regarding the feasibility or sustainability of the project.

1.3 Methodology

The applicable documentation was reviewed, with the costs and other figures being compared either to current costs or to industry benchmarks. In terms of the cost comparison against current costs, although all efforts were made to compare the costs, a full cost review was not possible given the limited information available in the three documents.

Practical experience and knowledge of the dairy industry in South Africa and the general agricultural industry was drawn on in assessing the concerns raised regarding the feasibility of the project.

In order to put the project into perspective some background information about the dairy industry in South Africa should be noted.

1.4 Background to the dairy industry in South Africa

The number of dairy farms in South Africa has declined to 2 083 from 3 899 between January 2007 and September 2013. In the Free State Province, the number of producers has declined by 57% over the same period, leaving only 423 current milk producers in the province. This decline is a result of higher production in the pasture-based areas, or the coastal areas. The cost of milk production in-land provinces is a key factor due to the increase in maize prices and other input costs.

In December 2007, the Free State province produced 18.0% of total milk in South Africa; by February 2012, this had declined to 10.5%, as a result of the declining number of producers and the increased production in the coastal areas, specifically in the Eastern Cape, KwaZulu-Natal and the Western Cape. Taking into consideration that the average herd size in the Free State is 111 cows in milk per producer (with a median of 79), the Vrede-project would be substantially different from the normal dairy farm in the province. This trend is confirmed by the information below.

Table 1: Number of milk producers per province

Province	Jan '06	Jan '07	Jan '08	Jan '09	Jan '11	Jan '12	Sept '13	% Change 07-13
Western Cape	878	827	815	795	683	647	573	-31
Eastern Cape	422	420	407	387	314	283	271	-35
Northern Cape	37	37	34	37	28	21	20	-46
KwaZulu-Natal	402	385	373	373	323	322	294	-24
Free State	1 067	987	919	884	601	535	423	-57
North West	649	596	549	540	386	352	253	-58
Gauteng	275	245	228	217	127	126	109	-56
Mpumalanga	407	357	302	286	201	164	119	-67
Limpopo	45	45	38	32	23	24	21	-53
TOTAL	4 184	3 899	3 665	3 551	2 686	2 474	2 083	-50

Source: Lacto Data, November 2013

Table 2: Milk production per province and cows per producer

Province	% Distribution of milk production		Number of cows in milk per producer 2012	
	Dec 1997	Feb 2012	Mean	Median
Western Cape	22.9	27.4	246	180
Eastern Cape	13.8	24.3	536	365
Northern Cape	1.2	1.0	188	112
KwaZulu-Natal	15.7	23.5	425	315
Free State	18.0	10.5	111	79

North West	12.6	3.5	78	52
Gauteng	4.4	5.5	248	151
Mpumalanga	11.0	3.6	116	75
Limpopo	0.4	0.7	207*	105
TOTAL	100	100	293	167

Source: Lacto Data, November 2013

One similarity between the project and the current trend in the dairy industry is that producers are getting bigger to achieve economies of scale. There are however concerns regarding the project which is under review, but it will be addressed in Section 2 under the documentation review and more generally in Section 3 in the conclusion.

D.A.M.

2 THE DOCUMENTATION REVIEWED

The terms of reference were to review three documents related to the Vrede-project.

- The project proposal
- The business plan
- The feasibility study

The comments on each document are outlined in the sections below, with specific page references where relevant.

2.1 Project Proposal

Two 8-page project proposals were received (see Annexure 1), the only difference being a substantial difference in the "Detailed Project costing for a large scale Dairy Unit".

- In one, Estina/Paras provides R500 million, with government grants amounting to R500 million (R100 million for 5 years)
- In the other, Estina/Paras provides R228 million, with government grants amounting to R342 million (R114 million for 3 years).

The detailed page-by-page comments appear in Table 3 below.

Table 3: Detailed comments on the project proposal

Page	Content	Comment
p3 – 1	Preamble	• The proposal claims that India is the largest milk producer in the world, which is true, only if buffalo milk is included. Refer to Annexure 4 for a graph showing the largest cow milk producing countries for the period 2010-2012. Note that the EU is given as the top producer, but this is for all the EU countries as a grouping. • Neither Paras nor Estina feature in the top 20 major dairy companies in the world. The Top 20 major dairy companies are listed in Annexure 5.
p4 – 3	Proposed DARD flagship project	In the penultimate bullet point on the page, the milk processing equipment does not mention UHT-milk production, although in the costing, a UHT-plant is budgeted for at a substantial cost.
p5	Second paragraph	The proposal notes that in the short term, milk will be procured from local famers, which raises a concern about the availability of milk from local producers given the declining number of producers in the Free State.
p5	Table 1	Employment opportunities are estimated at 600, which seems high given the mechanisation taking place in the sector.
p6	Detailed project costing	• Dairy cattle are costed at R25 000 per cow in milk and for followers. This is very high, since the current cost for a cow in milk is approximately R15 000 per cow for commercial cows. • The milking parlour is costed at R5 000 000, which is assumed to be only for the machinery;

Page	Content	Comment
		• Apart from the R 5 million budgeted for the milking parlour, a further R 15 million is budgeted for "other dairy equipment. Unfortunately there is no detail given as to the parlour and equipment that is planned for it but for an investment of R 15 million a state of the art, high-precision parlour can be erected. Depending on the type of operation envisaged, this might be unnecessarily high.
p7	Business Model	Estina plans to fund the project, but is requesting government to commit to grants to make the project sustainable and commercially viable. If a project is not commercially viable without grants, it should not continue and definitely not with government grants. The Business Plan indicates that the project will be profitable after the first year. If this is the case, grants are not necessary.
p8	The need for the Dairy Project	• The first bullet mentions that the sale of milk provides extra income on a regular basis to rural people. This is true for small-scale dairy producers and there are good examples of this in other regions and especially in other African countries. From the project proposal this project is however envisaged primarily as a large commercial project that will provide jobs in the rural area, rather than to promote small-scale milk production. There is a definite difference between the various business models. • Milk is a staple food in Europe, but not in Africa. Compared with the rest of the world, dairy consumption is still low to average in South Africa, with lactose intolerance being a limiting factor for the consumption of large amounts of milk by certain population groups.

Conclusion

The funding difference in the proposals is inexplicable. In either case, however, it raises concerns that government's funding is expected to be higher in one proposal than the other. It is not clear which proposal is the latest one; therefore it is not definite if government's exposure increased or decreased. In addition to which, if a project is commercially viable, government funding should not be necessary.

The need for the dairy project is not disputed, however it can be concluded that some of the costs of the project is unreasonable high, e.g. cow prices, equipment, etc. If the latter is the case the principal should do an in-depth cost-benefit analysis on the impact of the proposed project in the region. A project of this nature does not always benefit the local economy one hundred percent.

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2.2 Business Plan

The Confidential Business Plan (Annexure 2), comprising 6 pages plus 3 additional pages, was also reviewed, with the detailed comments appearing below:

- A well-planned dairy presents a number of opportunities for value-addition and beneficiation, which is in favour of the plan.
- As indicated in the project proposal, the dairy cows have been over budgeted for.
- It is unclear why provision has been made for a feedlot, if the plan is to sell cull cows and male calves (see "Sales/income" on page 5 of 6). Except if the plan is to finish them off in a feedlot, a feedlot might be necessary, but this not well defined in the business plan
- The assumption of average milk production per cow per day of 45 litres is unrealistic. The national average is 20.1 litres per cow per day. Under good conditions with excellent management, cows in general produce 30–38 litres per day.
- The cultivation area or area that will be used in the production of feed and grain differs between the different documents. In some cases it is 1200ha and in others 1500ha.
- The sales/income assumptions are rather liberal and unrealistic or not easily achievable.
- Under net profit, it says that *"agricultural production is likely to be more than the requirement for the animal feed"*, which is inconsistent with the Feasibility Study, which states on page 56 that the project is intended to provide local crop producers with a new market for their crops.

Conclusion

In conclusion, the business plan is inconsistent, for example, talking on one page of a 500-cow dairy yet on the very next page referring to 1 000 cows-in-milk. In addition, many of the initial assumptions are unrealistic and it will be difficult to attain. It can therefore be concluded that the business plan is not realistic and should be revisited.

2.3 Feasibility Study

The third and last document regarding the project reviewed was the 63-page Feasibility Study (Annexure 3). In general, it is extremely academic with little detailed information on the feasibility of the project itself; it presents more as an academic manual on different issues related to dairy production e.g. hay-making, etc. It contains no clear information on the processing side of the project, apart from costs and some other minor assumptions.

Chapter by chapter comments on the Feasibility Study are outlined in Table 4 below:

Table 4: Detailed comments on the Feasibility Study (Source: Maree, 2007)

Chapter	Comments
Introduction	Again there is a discrepancy in the number of cows in milk – 500 vs 1000.
Chapter 1: Herd Structure	The table below gives a herd structure for the 500 cows. If you compare that with the optimal herd structure, certain substantial differences in the number of animals in the herd can be noted. The table gives the optimal number of animals per 100 lactating cows, the structure for a unit of 500 cows-in-milk and for a unit of 1 000 cows-in-milk. A 500 cows-in-milk farm therefore would have a total of 1 050 animals of varying ages and stages on the farm.

Type of animal	Optimal per 100 lactating cows	500 cows in milk	1 000 cows in milk
Lactating cows: 1-100 days	23	115	230
Lactating cows: 101-200 days	23	115	230
Lactating cows: 201-300 days and more	28	140	280
Lactating heifers: 1-100 days	8	40	80
Lactating heifers: 101-200 days	8	40	80
Lactating heifers: 201-300 days and more	10	50	100
Dry cows: 3 weeks before calving	6	30	60
Dry cows	12	60	120
Heifers: 3 weeks before calving	5	25	50
Heifers: Pregnant	30	150	300
Heifers: +12 months, not pregnant	12	60	120
Heifers: 6-12 months	24	120	240
Heifers: 2-6 months	16	80	160
Heifers: 1 day - 2 months	5	25	50
TOTAL	210	1 050	2 100
Cows-in-lactation	*100*	*500*	*1 000*

Chapter 2: Site selection for the Dairy Buildings	Resources for site evaluation • Water is one of the major considerations when establishing a dairy. A sustainable, clean source of water is very important. There is no clear indication in the feasibility study on the source of water. Other considerations • As mentioned, this seems like an academic exercise, since snow control will not be an important consideration. The likelihood of snow in the

Chapter	Comments
	Vrede-district is not high.
Chapter 3: Types of buildings	It is recommended to obtain an opinion of an agricultural engineer with knowledge of the dairy industry to comment on the buildings. In my experience, provision is made for all the required buildings.
Chapter 4: Purchasing procedure of cows	This chapter is also an academic exercise. No indication is given of when, where, what type of cows, etc will be purchased. It further noted that all animals should be pedigreed (Point 11). This is not necessarily the case in a commercial dairy herd as it will not be a stud breeding project.
Chapter 5: Milking parlour	• No comparison was given of the benefits and disadvantages of the various systems. • No details of the rotary parlour were attached, as mentioned on p12.
Chapter 6: Dairy equipment	As is the case with the rest of the document, no details of prices of the various pieces of equipment are given and thus no comparable quotes either.
Chapter 7 and 8:	• The reproduction unit and the clinical unit can be combined. • With the high costs involved, it will be more feasible to use veterinary services, which are available, rather than to invest in the capital outlay in the project itself. The size of the project doesn't warrant a fulltime reproduction and clinical unit.
Chapter 9: Green fodder production	• This chapter was full of academic jargon, with no costing. • The list of equipment seems comprehensive, although the details of the costs, operation costs and replacement plan are lacking. • Irrigation water requirement: It is not stated or clear if irrigation water exists. If not, it will be a major limitation on the feasibility of the project in terms of feed production for the animals. • Agricultural chemical, fertilizer and seed: According to the feasibility study, an output of 6 ton/ha of maize is assumed at a cost of R 7 612/ha. Compared to Grain SA figures for 2012/2013, the production cost for conventional maize is R9 880,22/ha with an output of 5.5 ton/ha. The project therefore seems to under budget for maize production. Soybean production is estimated at R4 526/ha, with the Grain SA costing it at R3 896.55/ha. The output is comparable at 2 ton/ha. In this case the project over-budgets for the production costs of soybeans.
Chapter 11: Pasture development	In this chapter reference is made to 250 cows-in-milk (p 46). This is a discrepancy again from the 500 and 1 000 cows-in-milk scenario.
Chapter 12: Animal nutrition	• Feeding formulas are given in this chapter, however an animal nutritionist should evaluate the formulas to comment on the cost of the formula vs the production potential. • In the section on the annual water requirement of cattle, the table on p 55 gives the requirement as 88 200 litres although this figure is only per day. On an annual basis it will be 32.2 million litres, leading to a substantial difference in the calculations.

Economic impact on the local community and province

- In the first paragraph on p 56, local producers of equipment and other services are mentioned as benefitting from the project. Although this would be the case in a number of areas, purchasing of equipment should be excluded since the majority of dairy equipment used in high-precision operations is imported from either Europe or New Zealand.
- The figures quoted are debateable since the initial assumptions may not be correct or feasible, e.g. the 45 litre of milk per cow per day is unrealistic, meaning that income from the project will have been over-projected on this basis.
- The penultimate bullet on page 56 indicates that local producers will be provided with a new market for their crops. If that is the case, then perhaps the dairy project should not have its own operation for producing crops.
- A more comprehensive outline of the costs and purchasing procedure is necessary to do a proper farm-level impact. There is no indication of preferential local procurement; therefore it cannot be conclusive that the local economy will receive 100% of the benefits.

Financial implications

The land has already been acquired for the project but no mention is made of any existing operations. If any operations do currently exist, it is necessary to know what they entail.

500 cows are intended to be donated to the community with the milk produced from them being bought back by Estina, in a form of share-milking arrangement. No mention is made, however, of any contracts to be put in place with the farmer or what the terms of the arrangement will be.

The comments on the details of the project costing on pages 59–60 of the feasibility study are presented in Table 5 below.

Table 5: Project costing breakdown for the dairy unit and the dairy processing plant

Breakdown of the project costing for the dairy unit (p 59)		
Irrigation and mechanisation	R45 000 000	This figure appears feasible on the condition that the water resources are available.
Rain-fed mechanisation	R32 000 000	This figure seems unreasonable, since a large proportion of the costs will be covered under irrigation costs, e.g. tractors, etc
Dairy cattle – "Cows in Milk"	R25 000 (per cow)	This figure is unreasonable. The current market price is approximately R15 000 per cow.
Dairy cattle – Rest of herd	R25 000 (per cow)	This figure is also unreasonable. The current market price of pregnant heifers is approximately R13 000 per heifer.
Bulk cooling tanks	R 25 500 000	• The production estimate for the dairy project is 22 500 litres per day (500 cows @ 45 l/cow/day). • A more reasonable, but still high, estimate would be 17 500 litres per day (500 cows @ 35 l/cow/day). • This would require a bulk tank of more or less double the

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		daily production, therefore 30 000 litres plus. • If the project buys two 30 000 litre tanks to make provision for the expansion to 1 000 cows-in-milk, it would cost approximately R2 500 000 (Source: Maree, 2007) in total. The R25.5 million is therefore unreasonably high.
Dairy products manufacturing plant and pasteurizer	R14 million & R60 million	• The dairy products manufacturing plant and pasteurizer should be included in the costing for the processing plant. • The costs of R14 million and R60 million are also unreasonably high for the level of production of the project.
Animal feed plant and grain & oilseed mill	R29 million (total)	The total cost of R 29 million seems unreasonable, especially since the Feasibility Study does not make it clear which production system will be used; it is therefore difficult to give an opinion on the applicability of the cost or not.
Breakdown of the project costing for the dairy processing plant (p 60)		
UHT Long life milk plant	R149 million	A plant that can process 120 000 litre/day costs approximately R65 million, excluding the building. R149 million is therefore unreasonable.
Dairy products manufacturing	R46 million	There is already provision for equipment under the dairy farm costing (although it probably should not be located there). This seems to be double budgeting.
Working capital	R5 million	This figure seems to be on the low end of what would be required.

Financial performance

The detailed projected Profit & Loss and Income Statement, included in Appendix 1, are not detail enough to draw sensible conclusions either for the dairy or for the processing units. Secondly, as mentioned earlier, the assumptions used are not realistic or reasonable and therefore will have an impact on the income statement as well – a major flaw being the 45 litre/cow/day production assumption.

Conclusion

The Feasibility Study which was reviewed is very academic in nature, with no clear findings and recommendations. There is no detail on the costing of equipment, which make a proper analysis difficult. Furthermore the feasibility study only focussed on the primary production side of the project, although a processing plant is also foreseen. With regards to the latter, there is only limited information available on the processing plant and the related costs, but there is no further information such as a marketing study for the products to be produced. A complete cash flow projection is also absent from the feasibility study.

3 CONCLUSIONS AND RECOMMENDATIONS

The author of the review had no prior knowledge of either Paras/Estina or the Vrede Integrated Dairy Project; therefore, the concerns raised and the recommendations made are totally independent and impartial.

3.1 Concerns raised

Specific concerns related to the documents reviewed have been set out in the body of this report and are not repeated here. Below, I have set out further concerns and comments arising from the review:

1 All three documents lacked the information required to carry out a proper analysis of the project; for example, information on the detailed costing for equipment.

2 This feasibility study is more an academic study than a feasibility study and therefore contains a significant amount of jargon. In particular, however, the following concerns are raised:

(a) The study does not indicate, with respect to the buildings, whether local weather and climatic conditions were taken into consideration.

(b) The purchasing of cows information is very academic, but makes no mention of the following:

- What type of cows will be sourced
- Where the cows will be sourced
- When the cows will be bought etc.

A further concern arising from this is the availability of cows, since cows and pregnant heifers are scarce; furthermore, current established producers buy the cows when they became available. It is also not generally recommended to buy cows from all over the place, since the experience of dairy producers is that moving cows, for example, from one production area to another can result in significantly declining milk production, with the farmer potentially ending by culling the cow, thus turning a R15 000 milk cow into a R5 000 cull cow.

(c) Equipment and tractors seems to be double counted for, e.g. there is provision made for 8 62kW tractors, although it is not mentioned again. Furthermore the price of the individual pieces of equipment is lacking.

(d) In terms of irrigation water, there is a overabundance of academic jargon although the major concern is the availability of water and the licensing of the water rights.

(e) In terms of silage, using a contractor to make the silage would be recommended over producing it, since the production cost and the capital outlay would be lower.

(f) In terms of animal nutrition, the feeding requirements for the different categories of animal also differ. The services of an animal nutritionist should therefore be sourced to compile a proper feeding requirement.

(g) One crucial point which is also not noted in the feasibility study is possible contingency plans with regards to electricity cost and supply. The cost of electricity for a dairy is substantial, and more so for a processing plant. But the reliability of

supply is even more crucial. Milking has to take place at more or less the same time everyday and milk has to be kept cooled at all times, the same with manufactured dairy products. It is assumed that an Eskom electricity supply point is available for the dairy project; however provision should be made for alternative options in the case of interrupted electricity supply. Contingency plans in the form of generators, which are expensive, or the use of alternative and renewable energy may be an option to explore.

3 In terms of the processing plant, the following additional comments should be noted:

(a) If the processing plant relies solely on its own production, it is not worth the capital outlay projected in the costing. Even if the production is as assumed in the project, namely 22 500 litres per day, a batch pasteurizer can be installed for approximately R450 000, which is substantially less than the R60 million envisaged.

(b) The same applies to the other dairy equipment – the projected costing is far too high for the quantity of milk to be processed.

(c) In terms of the UHT milk plant budgeted for in the project proposal, this plant will not be viable for the production of the dairy project alone (less than 30 000 litres per day). Research indicates that a plant able to process 120 000 l/day would require an investment of approximately R65 million in equipment and R30 million in buildings and stores, totalling R95 million. For a further R20 million investment, an additional line could be installed, doubling the production capacity to 240 000 l/day. These figures demonstrate that the R149 million budgeted in the project for the envisaged UHT plant is substantially above cost.

4 Given the current trends and realities in the South African dairy sector, the most appropriate investment in the dairy industry would be in the coastal areas where the conditions for production are more favourable. An investment of this magnitude in the Free State province is considered too risky and not sustainable.

3.2 Recommendations

With the above concerns and comments in mind, the following recommendations are made:

- A detailed cost analysis of project should be done, which would require more detailed information to be provided.
- The unnecessary academic jargon should be removed from the feasibility study, which should then be reworked to conform to the principles of a feasibility study. To elaborate more, one should note that a feasibility study should also include the following (not an exhaustive list), which was found lacking or not well-defined in the case for the Vrede Dairy Project:
  - An analysis of the market, for both the primary production and the manufacturing level
  - More clarity on the business model and comparisons with other possible models
  - For the processing unit, a marketing and sales strategy where absent
  - Little mention is made of the management and personnel requirements and structure
  - Environmental issues where not addressed

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- Critical risk factors were absent and should be included in a feasibility study
- In terms of the financial performance the feasibility study included an income statement. However the following financial documents, with projections and assumptions, should also have been included: balance sheet, cash flow statement, and a break-even analysis
- A time-schedule for the project should form part of feasibility study.

- The profit and loss or income statement should be more detailed, with the primary dairy production and the processing unit being separated, in order to make more meaningful comments on the income statement in terms of industry benchmarking.
- In terms of risk associated with this type of project, it is recommended to determine a feasible exit strategy as well. Will there be a reasonable chance to recover the money investment should the project not come to fruition? The market risk for the manufactured products should have also been discussed in the feasibility study.

In conclusion, it is not recommended to continue with project in its current state since government will not receive value for money. The costs are not reasonable or market related.

4 REFERENCES

The following references were used in compiling this report:

1 Coetzee, K., (2013) *Lacto Data Statistics*, Vol 16 No 2, November 2013.

2 Maree, D.A. (2007) *Development of different technical, economic and financial benchmarks as management tool for intensive milk producers on the Highveld of South Africa*. M Sc (Agric) thesis. University of Pretoria. 2007.

3 Vrede Integrated Dairy Agribusiness Project Proposal.

4 Vrede Integrated Dairy Agribusiness Confidential Business Plan.

5 Vrede Integrated Dairy Agribusiness Feasibility Study.

6 Personal information and contacts.

5 INFORMATION ON AUTHOR

Dawie Maree obtained the degree B Sc (Agric) Agricultural Economics in 2000 from the University of Pretoria. He then went to Belgium and obtained the degree Master in Management (cum laude) at the University of Antwerp Management School in 2002. On return to South Africa he completed his M Sc (Agric) Agricultural Economics at the University or Pretoria, which he obtained in 2007 with a thesis titled: *"Development of different technical, economic and financial benchmarks as management tool for intensive milk producers on the Highveld of South Africa"*.

He was previously employed as agricultural economist at HG Grain marketing before he joined the Milk Producers' Organisation (MPO) as agricultural economist and regional manager of MPO North and MPO Eastern Cape. During this time, he wrote various articles for the Dairy Mail and presented the general and dairy economic conditions to producers on various meetings across the country. In 2008 he attended the International Farm Comparison Network in Kiel, Germany as representative of the MPO.

In April 2009 he joined Agri SA as an economist and functionary of the Commercial Policy Committee of Agri SA. In this position, he represents Agri SA on various forums such as the Agricultural Trade Forum, the National Disaster Management Advisory Forum, disaster management committees of the Department of Agriculture, Forestry and Fisheries. As a member of Business Unity South Africa (BUSA), Dawie also represent Agri SA in BUSA's activities dealing with issues that affect farmers directly. In 2009 Dawie attended a course on climate change and the mitigation thereof presented by the Swedish Meteorological and Hydrological Institute (SMHI) in Norrkopping, Sweden. The project was titled: *"Adaptation and mitigation of the effect of heat stress on South African Dairy Production"*.

Dawie has also attended various SACAU (Southern African Confederation of Agricultural Unions) workshops and conferences on issues of financing, food security, linking farmers to markets and other related issues in Africa. Dawie also made several presentations on issues pertaining to agriculture and food security, both locally and internationally.

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6 ANNEXURES

6.1 Annexure 1: Project Proposals

Refer to the separate document attached.

6.2 Annexure 2: Confidential Business Plan

Refer to the separate document attached.

6.3 Annexure 3: Feasibility Study

Refer to the separate document attached.

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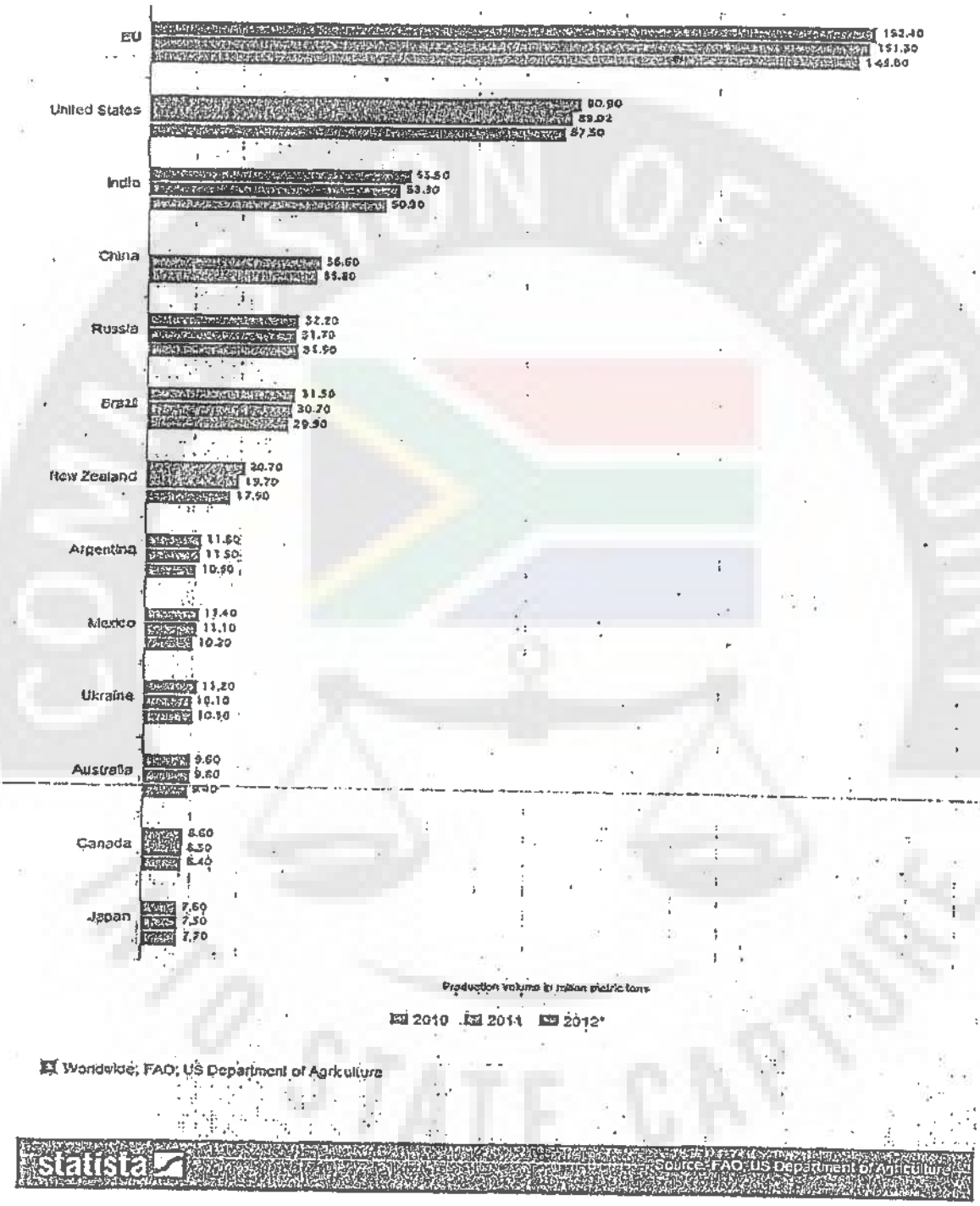
6.4 Annexure 4: Major producers of cow milk, 2010-2012

Major producers of cow milk worldwide from 2010 to 2012, by country (in million metric tons)



6.5 Annexure 5: 20 Major dairy companies, 2012

Rank	Company	Country	Market share (%)	Milk intake (Mt)	Dairy turnover US$ billion
1	Fonterra	New Zealand	3,0	21,6	16,4
2	Dairy Farmers of America	USA	2,4	17,1	13,0
3	Groupe Lactalis	France	2,1	15,0	16,9
4	Nestlé	Switzerland	1,7	14,9	19,1
5	Dean Foods	USA	1,7	12,0	13,1
6	Arla/MUH/Milk Link	Denmark/Sweden	1,4	12,0	12,0
7	Friesland/Campina	Netherlands	1,1	10,1	13,4
8	Danone	France	1,1	8,2	15,6
9	Kraft Food	USA	1,0	7,8	7,5
10	DMK	Germany	0,9	6,9	6,4
11	Saputo Inc	Canada/USA	0,8	6,3	7,0
12	Glanbia Group	Ireland	0,8	5,9	3,6
13	Land O' Lakes	USA	0,6	1,6	4,3
14	California Dairies	USA	0,6	4,4	3,0
15	Muller	Germany	0,6	4,1	6,5
16	Sodiaal	France	0,6	4,1	5,7
17	Mengniu	China	0,6	4,0	5,8
18	GCMMF	India	0,6	4,0	2,5
19	Yili Group	China	0,6	4,0	5,8
20	Bongrain SA	France	0,5	3,6	5,5
	Sum of Top 20		22%	167,6	183

Source: IFCN, 2013

Source: IFCN, Lacto Data, Nov 2013

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DAM-030

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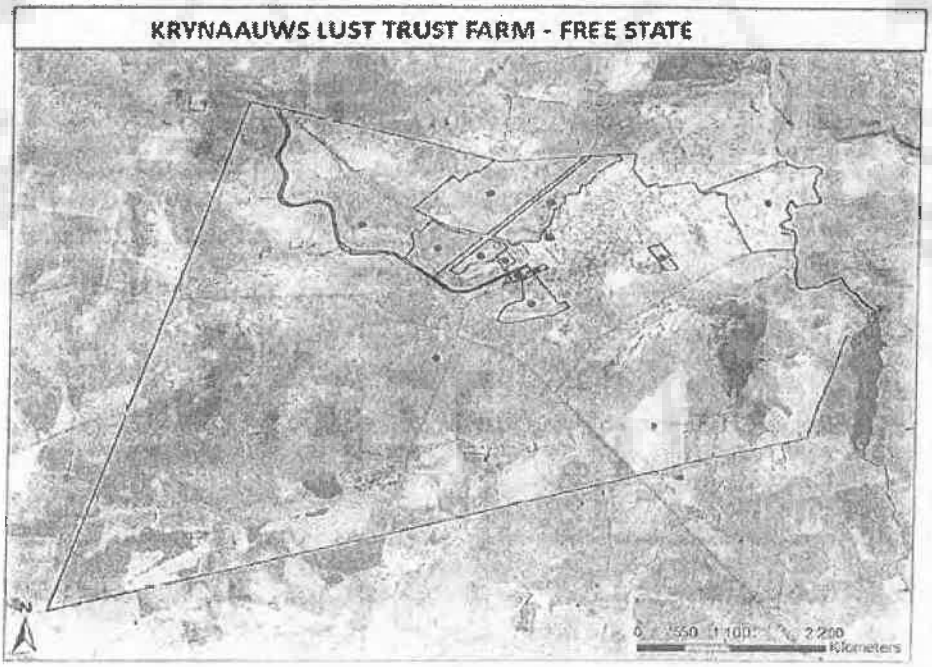
Agriculture and Rural Development
FREE STATE PROVINCE

PROJECT PROPOSAL

Vrede Integrated Dairy Agribusiness project: Proposed integration of Dairy and other elements of production and processing with the emphasis on value-addition and beneficiation, such as a range of processed dairy products



Contents

COMMISSION OF INQUIRY INTO STATE CAPTURE

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DAM-032

PARAS ESTINA

1. Preamble

The Department of Agriculture and Rural Development (DoARD), in line with the vision of the Mahoma Moburg initiative, has identified the implementation of a Dairy Project in Vrede as its flagship Project. To this end DoARD had recently commissioned a detailed study which validates the implementation of such a Project. The DoARD subsequently commissioned a high-level team to visit India, the largest milk producer in the world, to explore the possibilities of attracting investments in this area. **The DoARD team met with PARAS Dairy, the largest private milk producer in India and have agreed in principle to work with them on this prestigious project.**

2. Executive Summary

ESTINA PTY LTD is proud to inform the Department of Agriculture and Rural Development that it has signed a Memorandum of Understanding with **PARAS DAIRY**, the largest private milk producer in India, to deploy a flagship Dairy Project in Vrede. The Agreement covers setting up of Dairy Plants to produce milk and related Dairy products in South Africa. Although the DoARD team have already met with PARAS, it may be pertinent to list some of their strengths here :

1. **Biggest Private Milk processors** in India & the only Co. in North India to market **Bactofuged Milk**
2. 5 State of the Art **ISO 9001-2000 and HACCP Certified Manufacturing Facilities**
3. Total Liquid Milk intake of more than **720 Million Litres Per annum**
4. Processing capacity of **3 million Liters Per Day.**
5. Network Covering more than **5000 villages** & a **strong procurement base at village level**
6. Amongst the **Largest Suppliers of Liquid Polypack Milk (250,000 Litres/Day** supplied locally)
7. Fleet of **300 Stainless Steel** insulated road milk tankers
8. Modern Dairy Ingredients plant in collaboration with **WESTFALIA SEPERATORS, A.G.GERMANY, FILTERATION ENGINEERING Inc. USA., APPLEXION FRANCE, ALFA LAVAL**
9. Accredited as a **2 Star Export House** by the Govt of India

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DAM-033

3. Proposed DARD flagship project

Thabo Mofutsanyana District – Vrede Integrated Dairy Agribusiness project:
Proposed integration of dairy and other elements of production and processing with the emphasis on value-addition and beneficiation, such as Amasi as a possible dairy product.

A large-scale integrated commercial agribusiness project is being envisioned for implementation at Vrede in the Thabo Mofutsanyana District of the Free State, which would be highly sustainable and which can make a significant contribution towards general development in the area.

The objectives with the project are to:

- Utilise the existing natural and other resources to create a viable large-scale integrated agro-industrial enterprise;
- Broaden the agro-industrial production base of the district;
- Improve the food security situation for a number of rural communities;
- Create a number of small enterprises; and
- Alleviate the poverty of the surrounding communities.

Despite the fact that a large-scale dairy operation is under threat of a number of risks, those risks can be mitigated by the deployment of a highly skilled management team. A well-planned dairy operation presents a number of opportunities for the integration of other activities and downstream value-adding and beneficiation.

For the planned integrated dairy project to be sustainable over the long term, it is planned to ensure that:

- The dairy over the long term, maintains at least 1 000 cows-in-milk, implying that another 1 000 non-producing followers, mainly female animals are fed, namely young or pregnant heifers and dry cows;
- The dairy cows are sheltered against the sun and heat stress during the summer months as well as against extreme cold during the winter months;
- Proper milking equipment and buildings are created;
- Milk processing equipment needed for pasteurising, cold storage, yoghurt, cheese and Amasi production, as well as distribution vehicles are in operation;
- Effluent usage on crop fields to reduce the use of chemical fertilizers;

Nothing said about CHT, although noted in business plan details. Significant costs.

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Water rights?

- Feed production in the form of grains, annual legume crops, hay, lucerne and silage under dry land and 1 000 hectare of irrigation;
- Creation of facilities for the orderly storage, refrigeration, transport and marketing of the respective products; and
- Integration of small holder farmers on the periphery to produce various products under contract to the nucleus project.

In the short-term, the milk will be procured from the local farmers and then processed in-house. This operation will then gradually be expanded to include in-house rearing and milking of cows over the long term. In this manner, the risks envisaged in a large scale dairy operation will be mitigated by the gradual scaling up of the operation.

are there enough dairy farmers? Data MPO.

This project is designed to be the flagship of DoARD developments for the Free State in order to demonstrate the significant advantages to be enjoyed by the skilful integration of various elements in the agro-industrial value-adding system.

In Table 1 below a short summary is provided of the salient figures which apply to the planned project.

TM33: Estimated figures for the Vrede Project: Dairy, grains, beans, oilseeds, livestock production, processing, value addition, etc.	Estimated values
Total area available for project operations (hectare):	4 450
Natural veld grazing grazing (hectare):	3 100
Arable area (hectare):	1 350
Irrigable area (hectare):	1 000
Initial Fixed capital to be invested to render project viable (R'million):	500.00
Turnover (R'million):	80.00
Net profit (R'million):	16.00
Employment opportunities:	600

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4. Detailed Project costing for a large scale Dairy Unit:

FIXED & WORKING CAPITAL	UNITS	BUDGET VALUE
Irrigation & mechanisation	1,000 ha	R45,000,000
Rain fed mechanisation	1,350 ha @ R20,000	R32,000,000
Dairy cattle – "Cows in Milk" (CIM)	500 ea @ R25,000	R12,500,000
Dairy cattle – Rest of herd (Followers)	500 ea @ R25,000	R12,500,000
Dairy bulls / A.I		R500,000
Milking parlour – 1,000 CIM unit	1,000 ea @ R5,000	R5,000,000
Bulk cooling tanks		R25,500,000
Dairy products manufacturing		R60,000,000
Pasteurizer		R60,000,000
UHT Long Life Milk PLant		R149,000,000
Other dairy equipment		R15,000,000
Feedlot		R14,000,000
Grain & oilseed mill		R19,000,000
Animal feed plant		R10,000,000
Working Capital Requirement		R40,000,000
Total Funding Required		R500,000,000
Proposed Source of funding:		
Capital Injection/IP/Equipment etc	**ESTINA / PARAS**	**R500,000,000**
Grants of R100m/yr for 5 Years	**DoARD**	**R500,000,000**

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5. Phases for Project Deployment

In discussions with the Department, the Department has brought to the fore the problem of lack of funding for this Project which has been a major stumbling block in the execution of this project in the past. With a view to crystallizing the vision of the Department, Estina together with Paras Dairy are proposing a phased approach to the Project, whereby the Department will release available funds and Estina will ensure the implementation of the project in a modular form with technical know-how inputs from Estina/PARAS and when required, financial participation as well. Estina will prepare a project plan with clear deliverables based on the available funds released by the Department and will work with the Project Management Unit of the Department to ensure maximum returns on the amounts invested by the Department over a period of time. It is envisaged that as the project is delivered in phases, additional funding can be procured from various stakeholders when the viability of the project is demonstrated through the actual deployed working model.

6. Business Model

In line with the Agri-BEE business norms stipulated by Government, Estina proposes that a new Special Purpose vehicle (SPV) be created in which ESTINA will hold a 49% share while the remaining 51% shares will be distributed to at least three selected Grant recipients. Estina will provide the required capital injection as well as the technical know-how, which will be provided by Paras. Estina will endeavour to fund the entire Project itself and is **requesting the Government to commit to an annual Grant of R100m per year for FIVE years to ensure** that the Project remains sustainable and commercially viable.

7. Optimising the development potential of this flagship project

It is envisaged that this DARD integrated agribusiness project will become a centre of excellence for the entire Free State and even the neighbouring provinces.

Eventually this Project will provide:

- On-site, in-service practical agricultural training for aspirant farmers to equip them for the profitable operation and management of their own DARD projects, albeit:
  - Primary production of livestock and agricultural produce, or
  - Value-adding and beneficiation to livestock and agricultural produce
- Basic business, financial and management skills training and in-service application

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- Cooperative processing, value-adding and beneficiation of livestock and agricultural produce for all DARD projects in the Free State

Cooperative marketing facilities into the major consumer markets of South and Southern Africa for all DARD projects in the Free State thus creating the necessary critical mass and economies of scale which will unlock additional financial benefit for all DARD project participants

8. The need for the chosen Dairy Project

It can be concluded that there is an urgent need for this project based on the following facts:

- The sale of milk provides extra income on a regular basis to rural people who often have just enough to get by. Milk sales also improve the nutritional status of rural populations, though not necessarily the urban needy. Milk is also one of the few agricultural products which can be supplied and marketed regularly by non-landowners. A dairy plant creates jobs in rural areas, and thus helps check urban migration.
- Milk and milk products are thought of as staple foods in Europe. Favourable production conditions mean that everyone can consume large amounts of milk and dairy products. For many of the world's peoples, however, even though milk plays no role in the diet, if balanced food is available in sufficient quantities, neither health nor welfare should be affected by the lack of milk. Recommended Third World dairy policies fall somewhere between these two extremes. Milk protein can enhance plant protein and in a diet combining several foods, a compensatory balance is established among the various sources of proteins. Animal proteins supply essential amino acids, plant proteins can then economically top up the total supply.
- Many Third World countries find it hard to right the balance of payments: imported dairy products are one foreign exchange savings which can be effected by a dairy development policy. Moreover, international prices may go up in the medium or long run, placing a country which is not in a position to partially substitute imports by local production at a disadvantage.

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PARAS
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agriculture & rural development
Department of
Agriculture and Rural Development
FREE STATE PROVINCE

PROJECT PROPOSAL

Vrede Integrated Dairy Agribusiness project: Proposed integration of Dairy and other elements of production and processing with the emphasis on value-addition and beneficiation, such as a range of processed dairy products

aligned with the Agri-BEE business norms stipulated by Govt.

DAM-039

Contents

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S.G.

1. Preamble

The Department of Agriculture and Rural Development (DoARD), in line with the vision of the Mohoma Mobung initiative, has identified the implementation of a Dairy Project in Vrede as its flagship Project. To this end DoARD had recently commissioned a detailed study which validates the implementation of such a Project. The DoARD subsequently commissioned a high level team to visit India, the largest milk-producer in the world, to explore the possibilities of attracting investments in this area. The DoARD team met with PARAS Dairy, the largest private milk producer in India and have agreed in principle to work with them on this prestigious project.

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- 5 State of the Art ISO 9001-2000 and HACCP Certified Manufacturing Facilities
- Total Liquid Milk intake of more than 720 Million Litres Per annum
- Processing capacity of 3 million Liters Per Day.
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- Modern Dairy ingredients plant in collaboration with WESTFALIA SEPERATORS, A.G GERMANY, FILTERATION ENGINEERING Inc. USA., APPLEXION FRANCE, ALFA LAVAL
- Accredited as a 2 Star Export House by the Govt of India

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3. Proposed DARD flagship project

Thabo Mofutsanyane District :: Vrede Integrated Dairy Agribusiness project:
Proposed integration of Dairy and other elements of production and processing with the emphasis on value-addition and beneficiation, such as a range of processed dairy products

A large-scale integrated commercial agribusiness project is being envisioned for implementation at Vrede in the Thabo Mofutsanyana District of the Free State, which would be highly sustainable and which can make a significant contribution towards general development in the area.

The objectives with the project are to:

- Utilise the existing natural and other resources to create a viable large-scale integrated agro-industrial enterprise;
- Broaden the agro-industrial production base of the district;
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For the planned integrated dairy project to be sustainable over the long term, it is planned to ensure that:

- The dairy over the long term, maintains at least 1 000 cows in milk, implying that another 1 000 non-producing followers, mainly female animals are fed, namely young or pregnant heifers and dry cows;
- The dairy cows are sheltered against the sun and heat stress during the summer months as well as against extreme cold during the winter months;
- Proper milking equipment and buildings are created;
- Milk processing equipment needed for pasteurising, cold storage, yoghurt, cheese and Amazi production, as well as distribution vehicles are in operation;
- Effluent usage on crop fields to reduce the use of chemical fertilizers;
- Feed production in the form of grains, annual legume crops, hay, lucerne and silage under dry land and 3 000 hectare of irrigation;

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STATE CAPTURE

DAM-042

- Creation of facilities for the orderly storage, refrigeration, transport and marketing of the respective products; and
- Integration of small holder farmers on the periphery to produce various products under contract to the nucleus project.

In the short-term, the milk will be procured from the local farmers and then processed in-house. This operation will then gradually be expanded to include in-house rearing and milking of cows over the long term. In this manner, the risks envisaged in a large scale dairy operation will be mitigated by the gradual scaling up of the operation.

This project is designed to be the flagship of DoARD developments for the Free State in order to demonstrate the significant advantages to be enjoyed by the skilful integration of various elements in the agro-industrial value-adding system.

In Table 1 below a short summary is provided of the salient figures which apply to the planned project.

Project information table

IM33 Estimated figures for the Vrede Project: Dairy, grains, beans, oilseeds, livestock production, processing, value addition, etc	Estimated values
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Irrigable area (hectare):	1 000
Initial fixed capital to be invested to render project viable (R'million):	500.00
Turnover (R'million):	80.00
Net profit (R'million):	16.00
Employment opportunities:	600

All above figures are excluding VAT

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DAM-043

PARAS ESTINA

Detailed Project costing for a large scale Dairy Unit

FIXED & WORKING CAPITAL	UNITS	BUDGET VALUE
Irrigation & mechanisation	1,000 ha	R45,000,000
Rain fed mechanisation	1,350 ha @ R20,000	R32,000,000
Dairy cattle – Cows in Milk (CIM)	500 ea @ R25,000	R12,500,000
Dairy cattle – Rest of herd (Followers)	500 ea @ R25,000	R12,500,000
Dairy bulls / A.I.		R500,000
Milking parlour – 1,000 CIM unit	1,000 ea @ R5,000	R5,000,000
Bulk cooling tanks		R25,500,000
Dairy products manufacturing		R60,000,000
Pasteurizer		R60,000,000
UHT Long Life Milk PLant		R149,000,000
Other dairy equipment		R15,000,000
Feedlot		R14,000,000
Grain & oilseed mill		R19,000,000
Animal feed plant		R10,000,000
IP/Working Capital Requirement		R40,000,000
Total Funding Required	Excluding VAT	R500,000,000
Total Funding Required	Including VAT	R570,000,000
Proposed Source of funding		
Capital Injection/IP/Equipment etc	ESTINA / PARAS	R228,000,000
Grants of R114m/yr for 3 Years	DoARD	R342,000,000

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5. Phases for Project Deployment

In discussions with the Department, the Department has brought to the fore the problem of lack of funding for this Project which has been a major stumbling block in the execution of this project in the past. With a view to crystalizing the vision of the Department, Estina together with Paras Dairy are proposing a phased approach to the Project, whereby the Department will release available funds and Estina will ensure the implementation of the project in a modular form with technical know-how inputs from Estina/PARAS and when required, financial participation as well. Estina will prepare a project plan with clear deliverables based on the available funds released by the Department and will work with the Project Management Unit of the Department to ensure maximum returns on the amounts invested by the Department over a period of time. It is envisaged that as the project is delivered in phases, additional funding can be procured from various stakeholders when the viability of the project is demonstrated through the actual deployed working model.

6. Business Model

In line with the Agri-BEE Business norms stipulated by Government, Estina proposes that a new Special Purpose vehicle (SPV) be created in which ESTINA will hold a 49% share while the remaining 51% shares will be distributed to at least three selected Grant recipients. Estina will provide the required capital injection as well as the technical know how, which will be provided by Paras. Estina will endeavour to fund the entire Project itself and is requesting the Government to commit to an annual Grant of R100m per year for FIVE years to ensure that the Project remains sustainable and commercially viable.

7. Optimising the development potential of this flagship project

It is envisaged that this DARD integrated agribusiness project will become a centre of excellence for the entire Free State and even the neighbouring provinces.

Eventually this Project will provide:

- On-site, in-service practical agricultural training for aspirant farmers to equip them for the profitable operation and management of their own DARD projects, albeit:
  - Dietary production of livestock and agricultural produce, or
  - Value-adding and beneficiation to livestock and agricultural produce.
- Basic business, financial and management skills training and in-service application.

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SG

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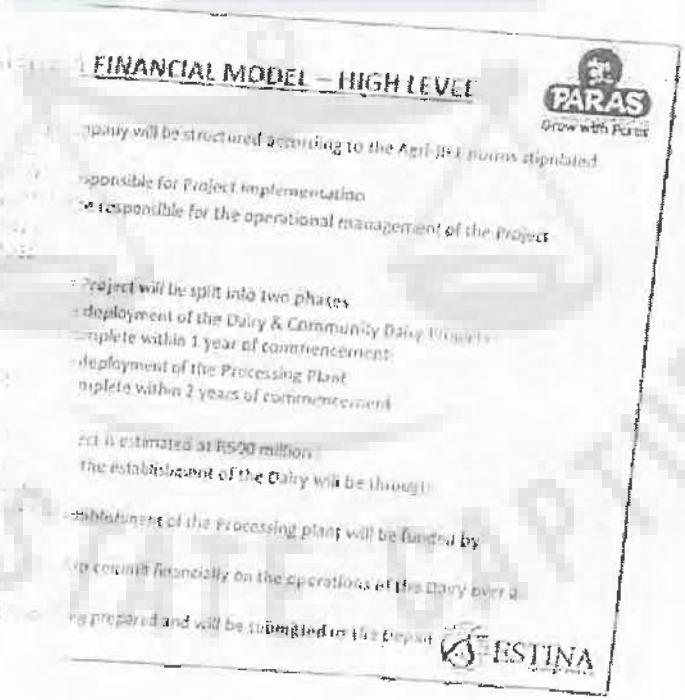
PARAS
Grow with Pure
PRODUCT PROFILE
A range full of health
PARAS
www.parasdairy.com
ESTINA


FINANCIAL MODEL – HIGH LEVEL
PARAS
Grow with Pure
ESTINA

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Cooperative processing, value adding and beneficiation of livestock and agricultural produce for all DARD projects in the Free State

Cooperative marketing facilities into the major consumer markets of South and Southern Africa for all DARD projects in the Free State thus creating the necessary critical mass and economies of scale which will unlock additional financial benefit for all DARD project participants

8. The need for the chosen Dairy Project

It can be concluded that there is an urgent need for this project based on the following facts:

- The sale of milk provides extra income on a regular basis to rural people who often have just enough to get by. Milk sales also improve the nutritional status of rural populations, though not necessarily the urban needy. Milk is also one of the few agricultural products which can be supplied and marketed regularly by non-landowners. A dairy plant creates jobs in rural areas, and thus helps check urban migration.
- Milk and milk products are thought of as staple foods in Europe. Favourable production conditions mean that everyone can consume large amounts of milk and dairy products. For many of the world's peoples, however, even though milk plays no role in the diet, if balanced food is available in sufficient quantities, neither health nor welfare should be affected by the lack of milk. Recommended Third World dairy policies fall somewhere between these two extremes. Milk protein can enhance plant protein and in a diet combining several foods, a compensatory balance is established among the various sources of proteins. Animal proteins supply essential amino acids, plant proteins can then economically top up the total supply.

Sanjeev Gantan
Managing Director
Date: May 15, 2012

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DAM-047

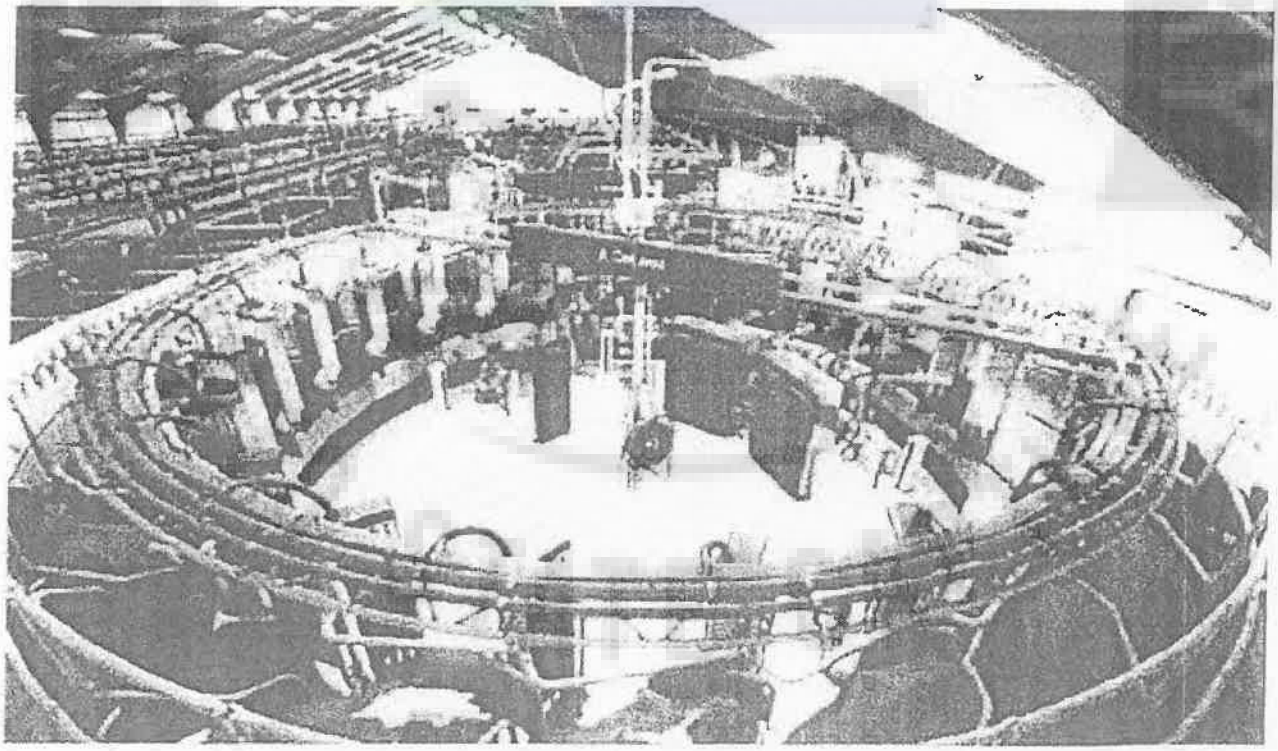
MOHOMA MOBUNG DAIRY
100% South African Milk

E TINA

agriculture & rural development
Department of
Agriculture and Rural Development
FREE STATE PROVINCE

VREDE INTEGRATED DAIRY-PROJECT

CONFIDENTIAL BUSINESS PLAN



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DAM-048

Introduction

Thabo Mofutsanyana District ::
Vrede Integrated Dairy Agribusiness project:

A large-scale integrated commercial agribusiness project is being envisioned for implementation at Vrede in the Thabo Mofutsanyana District of the Free State, which would be highly sustainable and which can make a significant contribution towards general development in the area.

The objectives with the project are to:

- Utilise the existing natural and other resources to create a viable large-scale integrated agro-industrial enterprise;
- Broaden the agro-industrial production base of the district;
- Improve the food security situation for a number of rural communities;
- Create a number of small enterprises; and
- Alleviate the poverty of the surrounding communities.

Establishing a modern confinement dairy offers nearby crop producers the opportunity to create a profitable new business that can also increase the profitability of their existing cropping operations. By marketing their crops through a dairy, grain and silage producers can improve their margins while profitably producing a valuable commodity that is increasingly in short supply in the Free State.

The model dairy presented here details the basic strategic, financial, and production framework for a 500-cow dairy situated on 3,368 hectares of land. Despite the fact that a large-scale dairy operation is under threat of a number of risks, those risks can be mitigated by the deployment of a highly skilled management team. A well-planned dairy operation presents a number of opportunities for the integration of other activities and downstream value-adding and beneficiation.

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DAM-049

For the planned integrated dairy project to be sustainable over the long term, it is planned to ensure that:

- The dairy over the long term, maintains at least 1 000 cows-in-milk, implying that another 1 000 non-producing followers, mainly female animals are fed, namely young or pregnant heifers and dry cows;
- The dairy cows are sheltered against the sun and heat stress during the summer months as well as against extreme cold during the winter months;
- Proper milking equipment and buildings are created;
- Milk processing equipment needed for pasteurising, cold storage, yoghurt, cheese and Amasi production, as well as distribution vehicles are in operation;
- Effluent usage on crop fields to reduce the use of chemical fertilizers;
- Feed production in the form of grains, annual legume crops, hay, lucerne and silage under dry land and 1 000 hectare of irrigation;
- Creation of facilities for the orderly storage, refrigeration, transport and marketing of the respective products; and
- Integration of small holder farmers on the periphery to produce various products under contract to the nucleus project.

In the short-term, the milk will be procured by in-house rearing and milking of cows from and then processed in-house. This operation will then gradually be expanded to include the local farmers over the long term. In this manner, the risks envisaged in a large scale dairy operation will be mitigated by the gradual scaling up of the operation.

This project is designed to be the flagship of DoARD developments for the Free State in order to demonstrate the significant advantages to be enjoyed by the skilful integration of various elements in the agro-industrial value-adding system.

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Break-down of Project costing for the Dairy Unit:

DAIRY FARM COSTING

FIXED & WORKING CAPITAL	UNITS	BUDGET VALUE
Irrigation & mechanisation	1,000 ha	R15,000,000
Rain fed mechanisation	1,350 ha @R20,000	R32,000,000
Dairy cattle – "Cows in Milk" (CIM)	500 ea @R25,000	R12,500,000
Dairy cattle – Rest of herd (Followers)	500 ea @ R25,000	R12,500,000
Dairy bulls / AI		R600,000
Milking parlour – 1,000 CIM unit	1,000 ea @R5,000	R5,000,000
Bulk cooling tanks		R25,500,000
Dairy products manufacturing		R14,000,000
Pasteurizer		R8,000,000
Feedlot		14,000,000
Other dairy equipment		R15,000,000
Animal Feed Plant		R10,000,000
Grain & oilseed mill		R19,000,000
IP/Working Capital requirement		R35,000,000
Total Funding Required	**Excluding VAT**	**R300,000,000**
To be funded by	**Dept. of Agriculture**	**R300,000,000**

Excluding AI.

70 ①

~~HHF - feedlot excluded~~

① Why feedlot if cull cows and bull calves will be sold.

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DAIRY PROCESSING PLANT COSTING

FIXED & WORKING CAPITAL	UNITS	BUDGET VALUE
UHT Long Life Milk Plant		R149,000,000
Dairy Products Manufacturing		R46,000,000
IP/AWorking Capital Requirement		R5,000,000
Total Funding Required	**Excluding VAT**	**R200,000,000**
To be funded by	Estina	R200,000,000
TOTAL PROJECT VALUE	**EXCLUDING VAT**	**R500,000,000**

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DAM-052

FINANCIAL PERFORMANCE:

Detailed Statement of Projected Profit & Loss and Income Statement enclosed as Appendix 1

Comments on Financial Performance:

Project Assumptions used in the financial Projections are as follows:

a. No. of Cows: 500
b. Average milk yield per cow per day: 45 litres; → Too high.
c. Total milk production per day: 22,500 litres
d. Total Milk produced yearly (320 days): 7,200,000 litres
e. Pasteurised Milk Produced yearly (69%): 4,968,000 litres;
f. Value Added Milk (25%): 1,800,000 litres;
g. Butter & Cream 124,200 kg;
h. Selling Rate:
- Pasteurised Milk: R8.00 per litre;
- Value Added Milk: R12.00 per litre;
- Butter & Cream: R40.00 per kg;

i. Cultivation Area: 1500 ha.
j. Total cost of Production of milk: R2.35 per litre (Detailed sheet enclosed).
k. Creditors: 15 days;
l. Debtors: 45 days;
m. Stock: 15 days;
n. Cows to increase to 550 in 2014-15 & to 600 in 2015-16.

Sales/Income:

The dairy shall start producing milk only from around April-May 2013. Therefore for 2013-14 the sales have been conservatively estimated to be for 9 months only. From 2014-15 onwards, full operating years will commence, with a total sale of R66.31mn. The sales are likely to increase by 10% to R72.94 mn due to adding of another 50 cows from the year 2016-17 as the heifer cows will start milking. The sale proceeds from the extra agricultural produce (Maize, Soybean, Hay etc) left after production of animal feed or the extra animal feed produced has not been taken into consideration. The milking cows will replace the cows which become dry on a regular basis. The female calves shall be retained by the dairy and dried cows and male calves shall be sold. The assumptions above are made conservatively and are realistic and achievable.

Not. good.

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DAM-053

Net Profit:

It would take 12 to 14 months for the dairy to become operational. This would result into a loss of R8.48 Mn in 2012-13 and R1.83 Mn in 2013-14. However, due to availability of land and backward integration the expenses on animal feed will be very low. Further, the agricultural production is likely to be more than the requirement for the animal feed. It is likely to generate additional income to increase the profitability. However, we have not considered it. It is therefore expected that in the very 1st year of full operations sufficient profit shall be generated to wipe out the initial accumulated losses. The Company has not forecasted any dividend during the currency of Bank finance. The PBDIT/Sales hovering around 70% and PBT/Sales is always more than 40% which reflects health profitability.

Conclusion

The following additional factors make a sound business case for the Project to succeed

a) There is a large scope for a dairy project in South Africa as presently the market is controlled by few companies which are making abnormal profits.
b) In South Africa the land is easily available and agriculture and farming is highly developed and modernised. Cattle farming is more evolved in meat production rather than dairy because the present dairy owners having the monopoly are exploiting the farmers and not giving them the reasonable price for the milk. So in case of any eventuality the milk can be procured from the local farmers at reasonable prices.
c) Land has already been acquired for implementing the project as well as the backward integration.
d) The Company is managed by the professionals and experienced people with long experience in this this line of activity.
e) Funding for the Project has already been committed to, both by the Department as well as the Promoters.

Appendix 1 enclosed

Appendix 2 – Project Plan enclosed

*** End of Business Plan ***

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Benchmark.

VRCDE DAIRY PROJECT - APPENDIX 1						
	ALL FIGURES ARE IN ZAR					
PARTICULARS	Projections	Projections	Projections	Projections	Projections	Projections
Years	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Operating months	5	9	12	12	12	12
Operating Statement						
i. Domestic Sale	-	22,104,000	66,312,000	72,943,200	79,574,400	79,574,400
Total Gross Sales	-	22,104,000	66,312,000	72,943,200	79,574,400	79,574,400
Less : Excise Duty						
Net Sales (1-2)	0	22,104,000	66,312,000	72,943,200	79,574,400	79,574,400
Growth in sales	0%	0%	200%	10%	9%	0%
Cost of Sales						
Raw Material	7,057,500	8,387,500	8,387,500	8,387,500	8,806,875	9,247,219
Direct Labour	800,000	2,400,000	2,400,000	2,400,000	2,520,000	2,646,000
Repairs and maintenance		480,000	600,000	660,000	726,000	798,600
Other Mfg. Expenses		500,000	500,000	500,000	550,000	550,000
Depreciation		6,750,000	6,750,000	6,750,000	6,750,000	6,750,000
Others expenses	625,000	5,290,000	5,790,000	5,790,000	6,294,000	6,514,000
Misc. Expenses	125,000	250,000	250,000	260,000	300,000	300,000
Electricity & Water	500,000	2,000,000	2,000,000	2,000,000	2,200,000	2,420,000
Harvesting Cost		2,540,000	2,540,000	2,540,000	2,794,000	2,794,000
Packaging/Transportation Cost		500,000	1,000,000	1,000,000	1,000,000	1,000,000
Sub Total	8,482,500	23,927,500	24,427,500	24,487,500	25,646,875	26,505,819
Add: Opening Stock		-	390,000	390,000	390,000	420,000
Sub Total	8,482,500	23,927,500	24,817,500	24,877,500	26,036,875	26,925,819
Deduct : Closing Stock	-	390,000	390,000	390,000	420,000	420,000
Cost of Production	8,482,500	23,537,500	24,427,500	24,487,500	25,616,875	26,505,819
Sub Total (Total Cost of Sales)	8,482,500	23,537,500	24,427,500	24,487,500	25,616,875	26,505,819
Gross profit	-8,482,500	-1,433,500	41,884,500	48,455,700	53,957,525	53,068,581
Gross Profit/ Sales	0.00%	-6.49%	63.16%	66.43%	67.81%	66.69%
Selling Expenses	0	1,000,000	1,100,000	1,210,000	1,331,000	1,464,100
Administrative Expenses	-	892,500	892,500	981,750	1,079,925	1,187,918
Sub Total	8,482,500	4,415,000	26,420,000	26,679,250	28,027,800	29,157,836
Operating Profit Before interest	-8,482,500	300,000	39,892,000	46,263,950	51,546,600	50,416,564
a. Interest on CC						
b Interest on TL						
c Other Interests	-		-		-	
Total Interest Paid	-	-	-			
Interest Income						
Net Finance Cost/Income (-)	-	-	-	-	-	-
Operating Profit after Interest	-8,482,500	300,000	39,892,000	46,264,950	51,546,600	50,416,564
Add: Other non operating income						
Sub Total	0	0				
Deduct other non operating expenses						
Interest/Dividend/Royalties etc..	0	0	-		-	-
Other Expenses		0				-
Intangibles written off -1				2,500,000	2,500,000	2,500,000
Sub Total	0	0		2,500,000	2,500,000	2,500,000
Net of other non operating income/Expenses	0	0	-	-2,500,000	-2,500,000	-2,500,000
Profit before Tax /Loss (PBT)	-8,482,500	300,000	39,892,000	43,763,950	49,046,600	47,916,564
Provision for Taxes			3,756,659	12,253,906	13,733,048	13,416,638
Net Profit/Loss (PAT)	-8,482,500	300,000	36,135,341	31,510,044	35,313,552	34,499,926
Cash Accruals	-8,482,500	7,050,000	42,885,341	40,760,044	44,563,552	43,749,926
Dividend paid + IT on Dividend	-	-	25,000,000	25,000,000	30,000,000	30,000,000
Retained Profit	-8,482,500	300,000	11,135,341	6,510,044	5,313,552	4,499,926
Retained Cash Profits	-8,482,500	7,050,000	17,885,341	15,760,044	14,563,552	13,749,926
RM Content in sales	0%	37%	0	0	0	0
PBDIT	0.00	7,050,000	46,642,000	50,513,950	55,796,600	54,666,564
PBDIT/Sales	0.00%	31.89%	70.34%	69.25%	70.12%	68.70%
Operating Profits/Sales	0.00%	1.36%	60.16%	63.42%	64.78%	63.36%
PBT/Sales	0.00%	1.36%	60.16%	60.00%	61.64%	60.22%
PAT/Sales	0.00%	1.36%	54.49%	43.20%	44.38%	43.36%
Cash Accruals/ Sales	0.00%	31.89%	61.67%	55.88%	56.00%	54.98%

VREDE DAIRY PROJECT : OCT 12, 2012

MILESTONES FOR PHASE 2 & PHASE 3

Activity

Week Commencing from 2013

PHASE 2

FODDER BANK DEVELOPMENT
Brain Storming & Planning
Farm Development
Processing of fodder for value addition
Building of Silage Bunkers

SITE/LAND DEVELOPMENT
Land Allotment & Handover
Plain Table Survey
Lay Out Plan
Site Office construction
Site Store construction
Security Post construction
Bore Well for water source

CENTRAL DAIRY UNIT :: CIVILS
Finalization of agency for civil work for cow sheds
Finalization of drawings
Award of Assignment
Execution of civil work for Cow Housing & Parlor Unit
Execution of civil work for Calving Pen Unit

CENTRAL DAIRY UNIT :: EQUIPMENT
Finalization of Supplier of Dairy Equipment
Award of Contract to supply Dairy Equipment
Delivery & Installation of Plant & Machinery
Trial Run of Parlor Unit
Commercial Run of Parlor Unit commencement

CENTRAL DAIRY UNIT :: CATTLE PROCUREMENT
Procurement of Heifer Cows
Procurement of Milking Cows

PHASE 3

COMMUNITY PROJECT / EXTENSION
Meeting With HOD & beneficiaries to agree on Plan of action
Concluding & implementation of action plan
Appointment of VLF
Group Formation (Five Farmer Group)
Cluster Formation (Five Group Cluster)
Orientation Training (Farm Level)
Live Stock Training

COMMUNITY MILK UNITS:
Vendor Selection for Equipment supply
Finalize the TOR for supply order
Concluding the action plan & Order planning
Execution of order
Supply of Cows to community members
Commencement of commercial operations with farmers

CENTRAL MILK PROCESSING UNIT
Identification of the vendors

DAM-055

VREDE DAIRY PROJECT : OCT 12, 2012

MILESTONES FOR PHASE 2 & PHASE 3

Key

- ASTM: Advisory Support Team Head
- PSTM: Project Support Team Head
- VLF: Village Level Facilitator
- CAM: Commercial Agriculture Head
- FBM: Fodder Bank Manager
- PM: Plant Manager
- DT: Dairy Technologist
- EE: Extension Expert
- Agency: Execution Agency

Private Commercial

DAM-056

DAM-057

MOHOMA MOBONG DAIRY

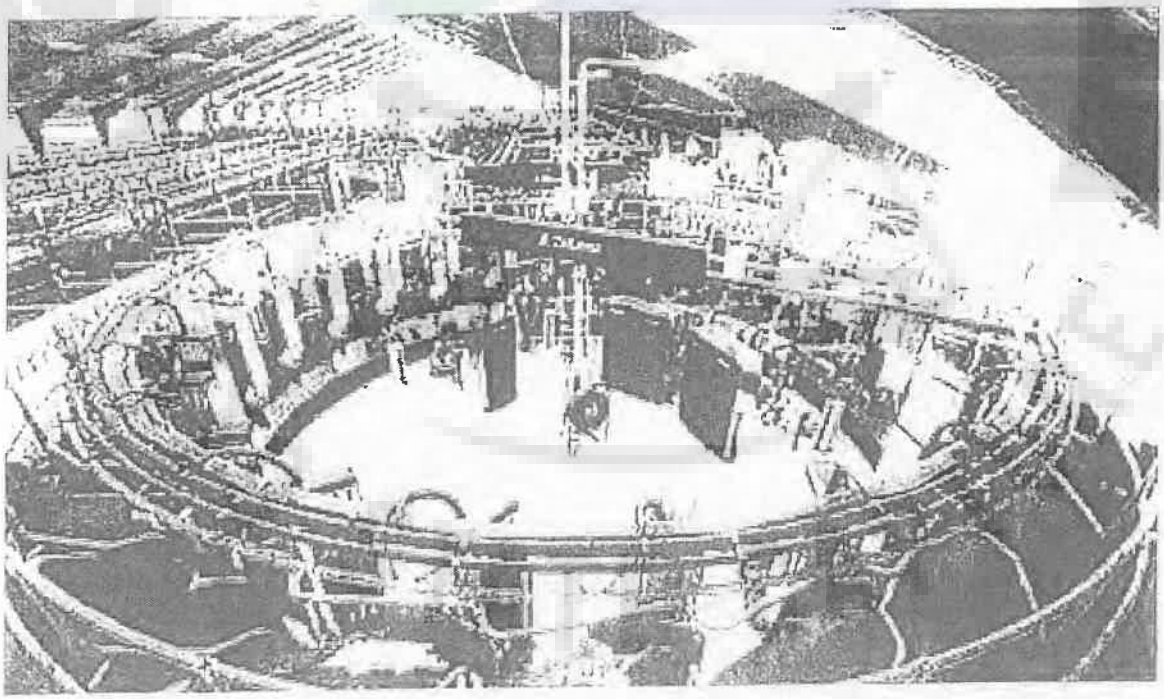
ESTINA

agriculture & rural development

Department of
Agriculture and Rural Development
FREE STATE PROVINCE

VREDE INTEGRATED DAIRY-PROJECT

FEASIBILITY STUDY



ESTINA

Introduction

Thabo Mofutsanyana District :: Vrede Integrated Dairy Agribusiness project:

A large-scale integrated commercial agribusiness project is being envisioned for implementation at Vrede in the Thabo Mofutsanyana District of the Free State, which would be highly sustainable and which can make a significant contribution towards general development in the area.

The objectives with the project are to:

- Utilise the existing natural and other resources to create a viable large-scale integrated agro-industrial enterprise;
- Broaden the agro-industrial production base of the district;
- Improve the food security situation for a number of rural communities;
- Create a number of small enterprises; and
- Alleviate the poverty of the surrounding communities.

Establishing a modern confinement dairy offers nearby crop producers the opportunity to create a profitable new business that can also increase the profitability of their existing cropping operations. By marketing their crops through a dairy, grain and silage producers can improve their margins while profitably producing a valuable commodity that is increasingly in short supply in the Free State.

The model dairy presented here details the basic strategic, financial, and production framework for a 500-cow dairy situated on 3,368 hectares of land. Despite the fact that a large-scale dairy operation is under threat of a number of risks, those risks can be mitigated by the deployment of a highly skilled management team. A well-planned dairy operation presents a number of opportunities for the integration of other activities and downstream value-adding and beneficiation.

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DAM-059

For the planned integrated dairy project to be sustainable over the long term, it is planned to ensure that:

- The dairy over the long term, maintains at least 1 000 cows-in-milk, implying that another 1 000 non-producing followers, mainly female animals are fed, namely young or pregnant heifers and dry cows;
- The dairy cows are sheltered against the sun and heat stress during the summer months as well as against extreme cold during the winter months;
- Proper milking equipment and buildings are created;
- Milk processing equipment needed for pasteurising, cold storage, yoghurt, cheese and Amazi production, as well as distribution vehicles are in operation;
- Effluent usage on crop fields to reduce the use of chemical fertilizers;
- Feed production in the form of grains, annual legume crops, hay, lucerne and silage under dry land and 1 000 hectare of irrigation;
- Creation of facilities for the orderly storage, refrigeration, transport and marketing of the respective products; and
- Integration of small holder farmers on the periphery to produce various products under contract to the nucleus project.

In the short-term, the milk will be procured by in-house rearing and milking of cows from and then processed in-house. This operation will then gradually be expanded to include the local farmers over the long term. In this manner, the risks envisaged in a large scale dairy operation will be mitigated by the gradual scaling up of the operation.

This project is designed to be the flagship of DoARD developments for the Free State in order to demonstrate the significant advantages to be enjoyed by the skilful integration of various elements in the agro-industrial value-adding system.

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Project Guidelines

The following sections detail the guidelines being followed in deploying the project

Chapter 1. Herd Structure

To calculate the number of animals in different categories, the following assumptions have been made-

1. The initial strength of herd 500 adult animals
   - Lactating Animals 300
   - Pregnant Animals 200

2. To calculate the feed and fodder requirement all the animals categories will be converted into adult units as follows
   - Cows and Heifers of over 12 months= 1 unit
   - Heifers from 6-12 months = ½ unit
   - All the calves below 6 month= ¼ units
3. Conception rate has been assumed as 60%
4. Mortality rate in adults has been assumed as 1% and in Calves 5%
5. The herd structure of a 500 adult unit dairy farm for a period of 3 years will be as per Table: 1

Table: 1 Herd structure of 500 cow dairy farm

Sl. No.	Category of Animal	I year	II year	III year
1	Milking cows	300	400	500
2	Pregnant cows	200	100	150
3	Dry and Heifers >12 months	-	40	50
4	Heifers 6-12 months	40	40+120	170+170
5	Heifers 3-6 months	40	50+120	130+170
6	Calves 1-3 months	50	20+110	25+145
7	Calves 0-1 months	20	25	30
Total		650	1025	1540
	Adult Units	550	700	995

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Chapter 2. Site Selection for the Dairy Buildings

Good site selection is essential for a successful dairy operation. Site selection requires careful planning to ensure that our investments allow us to build towards the future rather than continuing the past. A few essential factors are important to ensure that we have a site suitable for the present and for 20 to 30 years in the future.

Appendix 1 is a Map showing the total Land allocated to the Project at Vrede

Resources for Site Evaluation

Several resources are available for site evaluation, including tax maps, topographic maps, and soil survey maps. Each of these maps provides a different perspective of the site that should be evaluated. An aerial photograph of the existing operation also gives valuable information, including potential sites within a short distance of the farm.

Essential Site Factors

Potential sites should be eliminated if they cannot provide these four essential factors:

1. Water: A year-round supply of potable water is essential for watering animals and sanitation. Water is also needed for fire protection and cooling cows and milk. Between 200 to 250 litre of fresh water per cow are needed daily for lactating cow consumption and milking center cleaning.
2. Drainage: Proper surface and subsurface drainage are required to divert storm water away from animal housing units and to help prevent frost heaving of foundations. Select an elevated building site with a slope of 2 to 6 percent to provide adequate drainage while minimizing erosion.
3. Required area: The site should provide an area that is several times larger than the size of the animal housing unit.
4. Off-farm factors: The site must meet local building codes and pollution requirements. It should also provide adequate setback distances from neighbouring residences to avoid nuisance problems such as noise and odour. A site that is isolated from the residence and sensitive environmental habitats is ideal.

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DAM-062

Other Considerations

One should consider several other site factors when evaluating potential sites. These factors are not as essential as water, drainage, required area, and off-farm factors. However, a potential site should be eliminated if it cannot provide a majority of these other factors:

1. Access: The site should provide for the construction of all-weather roads for milk trucks, service personnel, feed delivery, manure handling equipment, and emergency vehicles. Plan for a minimum road width of 12 feet and for adequate turn-around areas. The minimum turning radius is 50 feet for a hay wagon and at least 55 feet for large milk or feed trucks.
2. Electric power: Electricity is needed for cooling, heating, lighting, pumps, and motors. The site should be located near electric lines and have access to three-phase power if it is available. A minimum 200-amp, 230-volt entrance is recommended and thorough grounding is necessary to reduce stray current problems.
3. Soil type: Soil should not be rocky, marshy, highly undulated.
4. Wind and snow control: The site should have windbreaks to help deflect winter winds and control snow. Take advantage of trees, existing buildings, and hills for winter wind protection; however, windbreaks should not interfere with summertime ventilation. Consider prevailing wind directions for reducing odour complaints and for controlling snow drifting, insects, noise, and dust.
5. Site should be near to pasture land: usually un-productive anumals like growing heifers, infertile and dry cows, bull calves are left on pastures for grazing. Between pasture and dairy buildings, there should not be any cross road so that accidents can be avoided.
6. Availability of man power: since all the operation of dairy farm requires man power therefor the dairy site should be established in such areas where sufficient man power is available.
7. Security: The site should provide security against theft, vandalism, and fire. Visitor access should be limited to control disease and to reduce interference with farm work. When dairy facilities are located on the same site as the manager's residence, the access lane should run near the home.

Not favourable 6

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Chapter No. 3. Types of Buildings

1. Dairy Buildings

Sl. No.	Types of Animal/Building	No. of Animal	Covered area/ani (m sq)	Total covered area (m sq)	Open area/ani (m sq)	Total open area (m sq)
1	Milking parlour	60	-	1600 (40x40)	-	-
2	Washing area	100	4	400	-	-
3	Drip area	100	4	400	-	-
4	Holding area	100	4	400	-	-
5	Milch ani. Shed (one side)	150	11.25 (7.5x1.5)	1687.5	22.5 (1.5x15)	3375
6	Milch ani. Shed (other side)	150	11.25 (7.5x1.5)	1687.5	22.5 (1.5x15)	3375
7	Calving pens	10	12 (3x4)	120	-	-
8	Down calvers	25	16 (4x4)	400	-	-
9	Advance pregnancy (one side)	40	11.25 (7.5x1.5)	450	22.5 (1.5x15)	900
10	Advance pregnancy (other side)	40	11.25 (7.5x1.5)	450	22.5 (1.5x15)	900
11	Pregnant heifer (one side)	40	11.25 (7.5x1.5)	450	22.5 (1.5x15)	900
12	Pregnant heifer (other side)	40	11.25 (7.5x1.5)	450	22.5 (1.5x15)	900
13	Adult heifer 6-12 months	70	5 (5x1)	350	10 (1x10)	700
14	Calves 3-6 months	60	4(4x1)	240	10 (1x10)	600
15	Calves 1-3 months	50	4 (4x1)	200	10 (1x10)	500
16	calves 1-30 days	25	3 (2x1.5)	75	-	-
17	Sick animals	25	12 (3x4)	300	-	-

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2. Other Buildings

a. Clinics- covered 50 m sq
Open 100 m sq

b. Reproduction unit
Covered 50 m sq
Open 100 sq

c. Cattle feed factory
Covered 250 m sq
Open 200 m sq

d. Workshop
Covered 250 m sq
Open 500 m sq

e. Stores
i. Maize grain store for 1500 MT = 2550 cubic meter capacity
ii. Soybean grain store 1500 MT = 2550 cubic meter capacity
iii. Molasses storage tank 200 MT capacity
iv. Hay store (Lucerne) 900 MT= 600 cubic meter

f. Implement Shed Covered 1000 m sq
Open 2000 m sq

g. Silage bunkers Open 2500 m sq

Qualities of dairy buildings

The dairy buildings are a very important aspect for successful rearing of animals. They are usually constructed before the purchase of animals and persist for a long duration. Therefore, before their construction, the dairy farmer should thoroughly think and discuss about designing, arrangement of buildings, directions distance from one building to another and placement of different types of buildings. The main objective of constructing a dairy building is to provide maximum comfort to

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animals and workers and to get maximum production from animals. Once they have constructed there will be very less chances to expand and alter them. Therefore before construction, all the aspect of dairy building should thoroughly studied.

1. Design: The main parts of dairy buildings are roads, gates and buildings itself. They should be constructed in such a manner that they should look like attractive, remain durable for long time and easy to maintain hygiene.
2. Arrangement of buildings: arrangement of buildings should be done in such a way that the labour efficiency should remain maximum and the building can be washed easily from minimum places. The buildings having maximum operation should be each other like milking animal sheds, calf pen, milk parlour and milk processing plant.
3. Distance between buildings: distance between two dairy buildings should be kept in such a manner that the chances of fire should remain minimum and labour efficiency should remain maximum. Usually distance between two buildings is kept 6 to 10 meters.
4. Directions of the buildings: The long axis of the shed should be kept in such a way that the sheds get maximum sunlight and protect the animals from high wind currents.

Types of Sheds

Usually the dairy Sheds are of two type

- Face to Face
- Tail to Tail

Considering the management and feeding aspects face to face is preferred over tail to tail system. While deciding the type of houses, it is also necessary to decide the area for covered and open space. These factors are important with respect to health, hygiene and comfort of animals.

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DAM-066

Chapter 4. Purchase procedure of cows

While planning to purchase a cow, one must consider the following:

1. Distant vision: First the purchaser should view the cow from the distance of about ten feet. During this phase, he must take observations on the behaviour of the cow towards her companions and visitors. The cows with nervous, excited, furious and attacking behaviour should never be purchased. Always try to purchase the cows having docile behaviour.

2. Gait of the animal: The gait of the animal should be well balanced and proud. The animals with symptoms of lameness, pressing gait, very fast gait and very slow gait should never be selected for purchase.

3. Angularity: The dairy animal's body is always angular. The dairy cow must contain angularity from sides, top of the body and front of the body. The angularity of the cow indicates its ability to eat, digest, vigour and to reproduce.

4. Body attachments: The body attachments of neck to head, Neck to body, legs to body and udder to body should always be strong and smooth. No joint should have any type of swelling and deformity of any type.

5. Structures of head: The structures on head should normal and free from any type of defect.
   - Eyes: The eyes of the animal should be bright, clear slightly bulging well developed and free from any type of discharge.
   - Ears: The ears of the animal should be clear from any type of exudate and discharge, active and responsive to any type of sound.
   - Nostrils: The nostrils of the cow should be broad, open, and free from any type of obstruction and should not have any type discharge. The pushy, watery or bloody discharges are considered as symptoms of diseases of respiratory system.
   - Muzzle: The muzzle of the animal should be slighly moist. It should not be dry too moist or with any type of discharge.
   - Fore head: The fore head of the animal should according to its breed. It should neither be too depressed or too bulging. It should flat clear and free from any type of defects.

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- Bridge of the nose: The bridge of the nose of the animal should be straight and well developed .It should neither be depressed nor bulging. However, in jersey breed the bridge of the nose is depressed and in sahiwal it is always raised. In H.F. breed it is straight, long and well developed.

6. Tail: The tail of the animal should be long, smooth and tapering. The tail should not have any type of knots, swellings and deformities. The switch of the tail should have clean hairs. Any type of locking, sloughing and soiling should be avoided.

7. Skin of the animal: The skin of the animal is good indicator of animal's health. The glistening and smooth skin is an indicator of good health. The dry skin, erected hairs dirty skin is indication of some systemic disease. Presence of any type of ecto parasites on the skin is an indication of ill health.

8. Milking behaviour: The animal should be easy milker. Hard milker, loose milker or leaking from the teats should be avoided.

9. Eating behaviour: The animal should be aggressive eater. The slow and choosy eater should be avoided.

10. True to breed: The animal should be true to its breed. Any deviation in colour pattern, size, shape and morphological make up should be avoided.

11. Pedigreed: AL the animals should be pedigreed.

12. Lactation stage: The cows should be in first or second lactation and with one or two month's lactation stage.

13. Herd mate average: The herd mate average should be not less than 30 litres per day or 10000 litres per lactation.

14. B.C.S. Score: The B.C.S. score of a lactating cow should be not less than 3.5.

15. Individual Yield: The milk yield of the cow should be not less than 30 litres per day.

Not necessary for commercial dairy. Low breeding

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16. Pregnant heifers: The pregnant heifers of more than 6 months pregnancy can also be purchased but their mother's lactation yield should not be less than10000 litres per lactation.

17. Health status: The health status of the cow should be good. The cow should not be suffering from any contagious, parasitic and metabolic disease. She should be free from any metabolic disorder. The cow should do not be suffering with mastitis, Tuberculosis, Jhon's Disease and CA etc.

18. Sire index: Sire index should be positive with daughter's average of more than 10000 litres per lactation.

19. The Udder is the most important part of dairy animals. It should be free from all the diseases and loose attachments.
    - Balance of udder: The udder of the cow should be well balanced with strong median and lateral attachments. Both the halves and all four quarters should be well balanced having strong attachments.
    - Texture of the udder: The udder should soft, pliable and elastic in nature. It should be free from any type of obstruction fibrosis and hardness.
    - Strong ligaments: The medium lateral ligaments of the udder should be enough strong providing full support to the udder.

20. Teats: Teats are the important part mammory system of dairy animals. The Placement, attachments, and size of the teats should be appropriate.
    - Size of the teats: The teat size of the cow should be according to its breed. In Holstein Friesian, the teat size is always medium. Large size teats are not preferred in H.F. cows. They should be of equal size and shape.
    - Teat placement: The teats should be squarely placed.
    - Teat canal: the teat canal should free from any type of obstruction fibrosis.

21. Milk veins: The milk veins of a dairy cow should be long, tortuous and well developed. They should be free from any type of obstruction.

22. Tail: It should be long, tapering and free from any type of tortiousness.

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23. Legs: All the four legs of the cow should be straight, strong and free from any type of curve, swelling and fibrosis. The animal should take equal weight on all four legs while walking. It should not show any type of lameness while walking.

24. Leg joints: The joints of fore and hind legs should strong and free from any type of swelling. The animals having buck legs ,straight and sickle shape hind legs should never be purchased.

Chapter 5. Milking Parlour

Milking parlours are of three types

- Static parlour
- Rotary parlour
- Robotic parlour

In static parlour, the platform to keep the animals is higher and the operator stands 60-70 cm. below the platform. In this system all the animals are fixed in different columns at the same time and milking machine is started at the same time for all animals. After milking they are sending out of the parlour. During taking in and sending out it take few minutes more times to fix the animals of 2nd batch.

In rotary parlour the whole platform is around 70 cm above the ground and the animals kept in rotation. In this type of parlour, just after milking the animals are taken out and other animals are fixed. This parlour takes lesser time than static parlour.

In both these parlours, the handling of animals and the milking machine is done manually.

In robotic parlour, all the operations are performed by robots. It is less time consuming, requires minimum labour and maintain complete hygiene. It is latest technology but due to high cost and ultramodern technology, it is not practicable in small and medium sized dairy farms.

Details of rotary parlour are attached, as obtained from the manufacturer, DeLaval.

Not available

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Chapter 6. DAIRY EQUIPMENTS

Prices ?
Comparable quotes.

1. Milk cans
2. Mixer Wagon 12 cubic with scale indicator-1
3. CC1800 cubicals-500
4. M40R Mattresses-500
5. Alley Mats-8
6. Cow Housing Fans-64
7. SCB Cow Brushes-9
8. DCC Somatic cell counter-1
9. AFB Auto Foot Bath-1
10. CF150X Calf Feeders-4
11. PM30P Calf Pen Mat-1

Chapter 7. REPRODUCTION UNIT

The main objective of establishing a reproductive unit at a dairy farm is to do artificial insemination, treat the infertile animals and to handle the cases of dystocia, retained placenta and abortions. For establishing a reproduction unit following points must be kept in mind:

1. Buildings required: The reproductive unit must have at least three rooms with barandah and open area of about 200 sq meters for holding the animals at one place till operations started. There must be at least two cattle crates i.e. one for A.I. and other for handling the cases of infertility and reproductive disorders.
2. Instruments: The instrument required for reproductive unit are as follows

• Deep freeze	one
• Liquid nitrogen containers	two large and two small
• Frenze	one
• Ultra sound system	one set
• Digital thermo meter	two
• A. I. Guns	five
• Computer with printer, photo copier and scanner etc.	
• Dystocia set	one,
• Microscopes	Three
• Other instruments.	

Necessary ?

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Chapter 8. ESTABLISHMENT OF CLINICAL UNIT

The clinical unit is necessary at a dairy farm to provide immediate treatment facilities to the animals. A clinical unit must have following facilities.

1. Buildings: A clinical unit must have following buildings
   - At least three rooms and two hundred square-meters open area for storing and restraining the animals, until the treatment.

2. Equipment: Following equipment will be required for the clinical units
   - Deep freeze
   - Freeze
   - Ultra sound set
   - HPLC
   - Microscope
   - Operation set (including table, lamp and instrument)
   - Dystocia set
   - Computer set with printer, scanner and photo copier
   - Blood analyser
   - Hoof treamer
   - Glucose meter
   - Pyrogen free water distillation plant
   - Other miscellaneous equipment.

Necessary? High cost. Vet serving

Combine. Reproduction and Clinical unit if needed.

Chapter 9. Green Fodder Production & Implements Requirement

A. Land Requirement

a. For summer/rainy season

Sl. No.	Crop	Feeding to animal/day (Kg)	Annual Requirement (MT)	Yield MT/Ha	Land Requirement ha
1	Maize grain	7.5	1370	5	274
2	Soybean grain	8	1460	2	730
3	Maize Silage	16 kg silage ie= 25 kg green	4563	30	150
4	Maize green*	25	1125	30	38
Total					1192

*Maize green will be supplied 90 days

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b. For Winter Season

Sl.No.	Crop	Feeding to animals/day (Kg)	Annual Requirement (MT)	Yield MT/Ha	Land Requirement ha
1	Lucerne Green	25	1500	20	75
2	Oats green	25	1500	20	75
3	Lucerne hay	5 ie= 25kg green	4563	20	228
Total					378

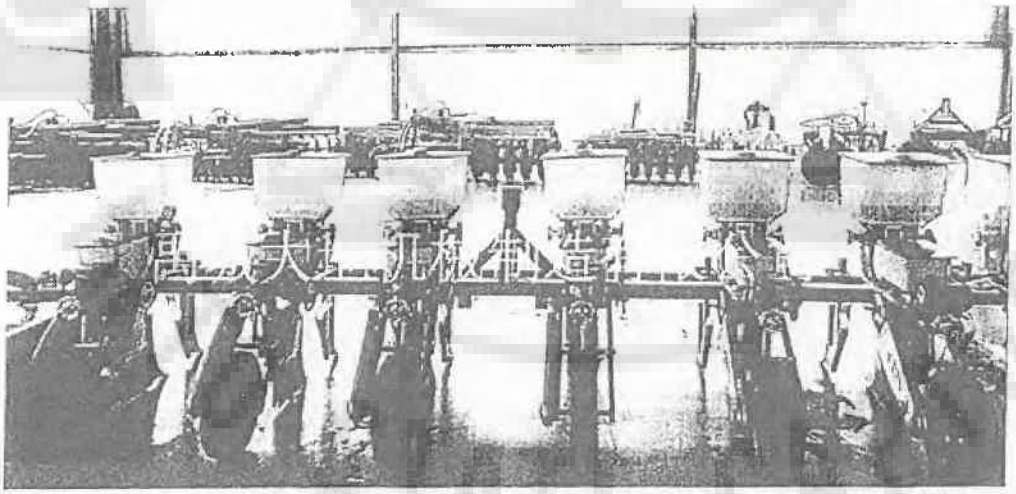
*Lucerne and Oats green will be supplied 120 days

- Total cultivated land requirement is 1200 ha.
- Winter crop can be grown in irrigated condition so irrigated area should be 400 ha.
- We will feed the animals with soybean in place of HPR. Cost of cultivation of soybean is R 2122/MT while purchase price of HPR is R 7575/MT.

8. Equipment and Implements Requirement

1. Maize Planter

- For sowing of Maize and Soybean
- Requirement 2 nos.



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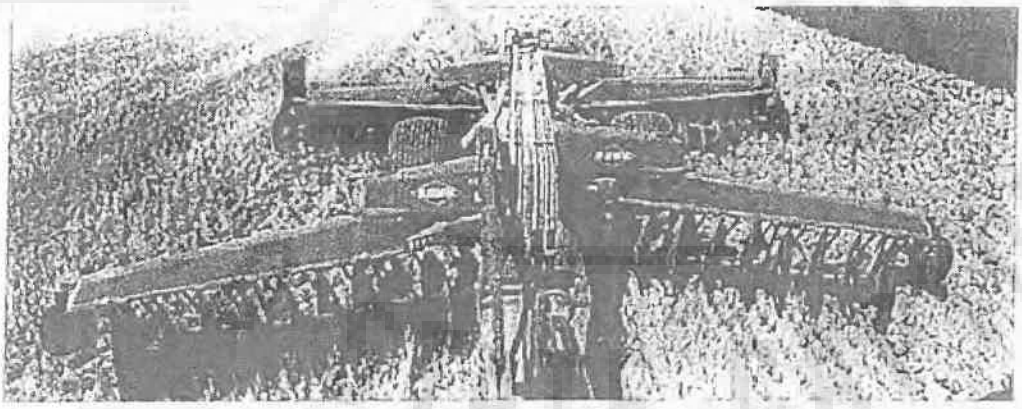
2. **Sprayer 2000lt.**
   - For spraying plant protection chemicals.
   - Requirement 2 Nos.

3. **Disk Harrow**
   - Requirement 36 Disc-3, 28 Disc-3



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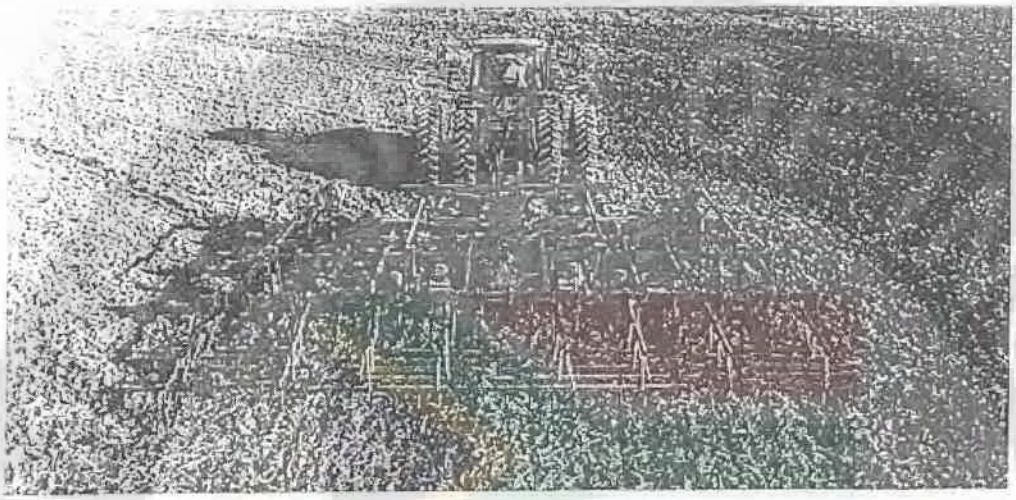
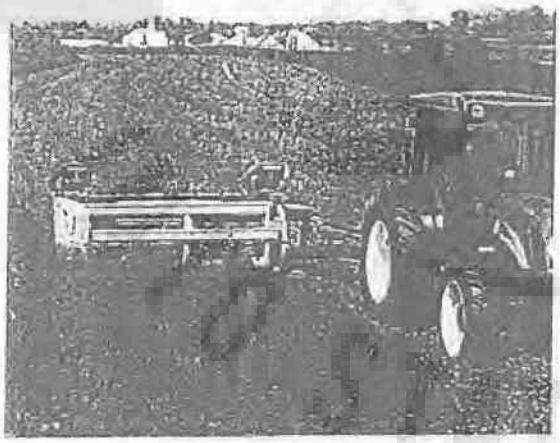
4. **Seed Bed Conditioner**
   - To prepare seed bed.
   - Requirement 2 nos.



5. **Mower Conditioner**
   - To cut /harvest the crops and conditioned them
   - It can harvest all type of crops like Lucerne, Berseem, and Oats etc.
   - Requirement 2 Nos.



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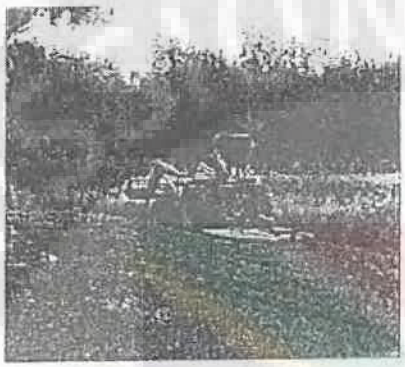
6. **Rotary cutter**

- It is also a mower best suited in undulated land.
- Works best with hard and short crops like love weeping grass.
- Makes row of green fodder after mowing.
- Requirement 2 Nos.



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7. Tedder

- Spreads green fodder in the form of thin layer on the field.
- Spreading facilitate the fast drying of green fodder.
- Fast drying helps in preservation of carotene in fodder.
- Plays major role in hay baling.
- Requirement 2 Nos.

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3. Rakes
   - Converse the dry and spreaded fodder in a row
   - Its helps in baling operation.
   - Requirement 2 Nos.

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9. **Hay Baler round**
   - Very useful equipment for fodder preservation in the form of hay bales.
   - Best for baling of Love Weeping Grass, Maize residue, Soybean resid ue etc.
   - Requirement 1 no.

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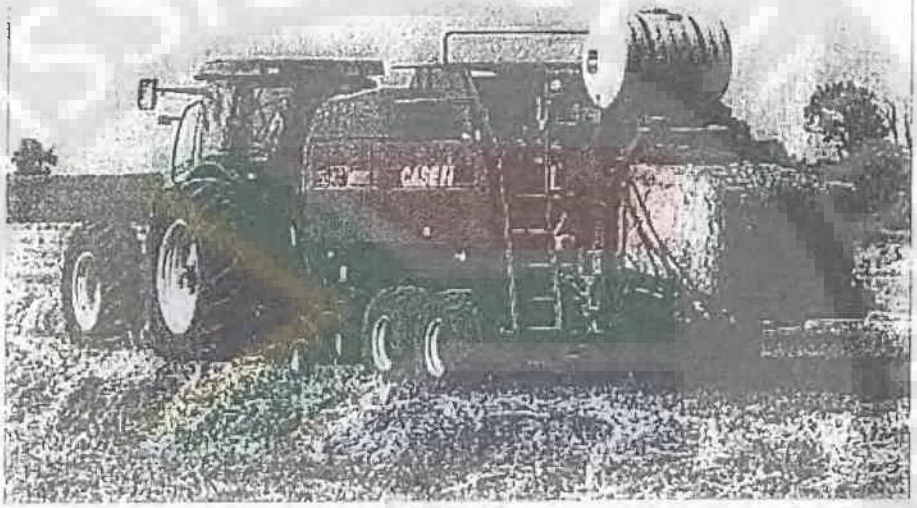
10. **Hay Baler square**

- It makes square bales.
- Best suited for small crops like Lucerne.
- Long term storage of square bales is easy.
- Requirement 1 No.



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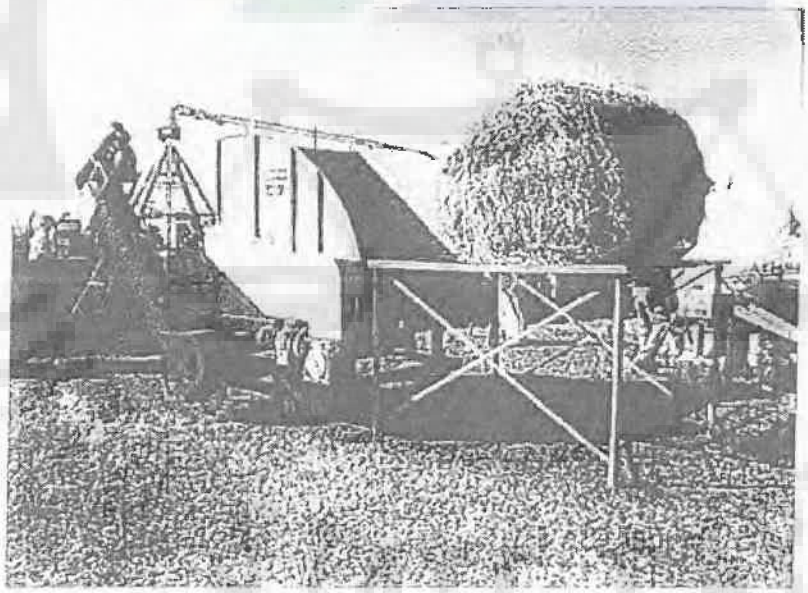
DAM-080

11. **Maize Harvester/ combined harvester**
    - For harvesting of mature crops of grain maize.
    - May be self-propelled or tractor driven.
    - Requirement 1 No.

12. **Hay Bale chopper**
    - Useful for chopping of hay bales
    - Chopping of hay facilitate the TMR.
    - Requirement 1 No.



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13. **Skid Steer**

- Very useful machine for silage cutting and delivery to TMR.
- Best machine for dung cleaning from sheds and loading area.
- Requirement 3 nos.

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14. **Fertilizer spreader**

- For spreading of granular fertilizers uniformly on the field.
- Works for basal application and topdressing of fertilizers.
- Requirement 1 no.

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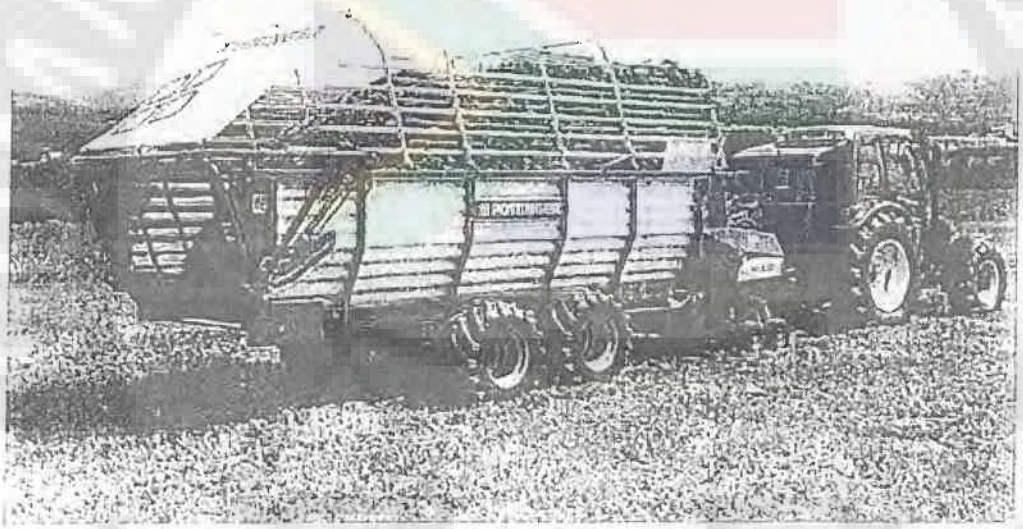
DAM-083

15. **Self-loading wagon**

- Self –Loading mechanism for mowed green fodder directly from field.
- Also un-load the green fodder in animal shed.
- Equipped with chopping mechanism, chops fodder during loading.
- Requirement 2 Nos.



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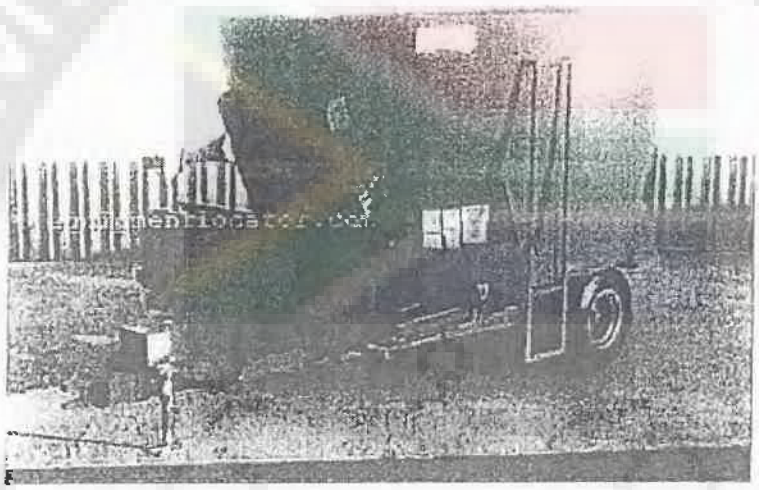
16. TMR (Total Mix Ration) wagon

- For the mixing of all feed ingredients like cattle feed, hay, silage etc.
- Save the wastage of feed from shade.
- Mixing proportion can be change according to need.
- Requirement 1 No.



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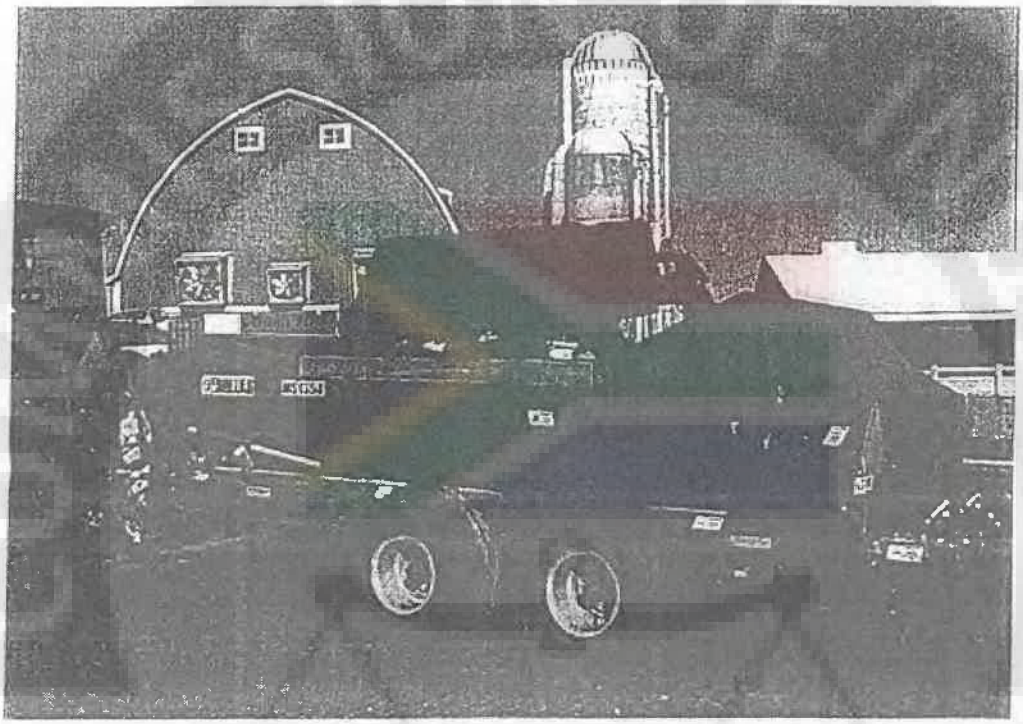
17. **Manure spreader**

- For uniform spreading of manure in field.
- Also equipped with the crushing mechanism.
- Requirement 1 No.



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12. **Liquid manure spreader**
    - To spray the animal wash, urine and other shed liquid in the field.
    - Such liquids have insect repellent qualities.
    - Requirement 1 no.

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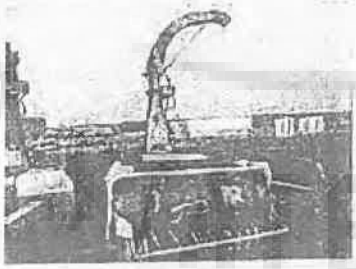
19. **Feeder wagon**
- For transferring the TMR feeds from mixing site to sheds.
- Requirement 1 No.

20. **DLB**
- For soil preparation
- Requirement 2 Nos.

21. **Maize Harvester**
- For harvesting and chopping of standing green maize in fields.
- Useful in silage making process.
- Requirement 2 Nos.



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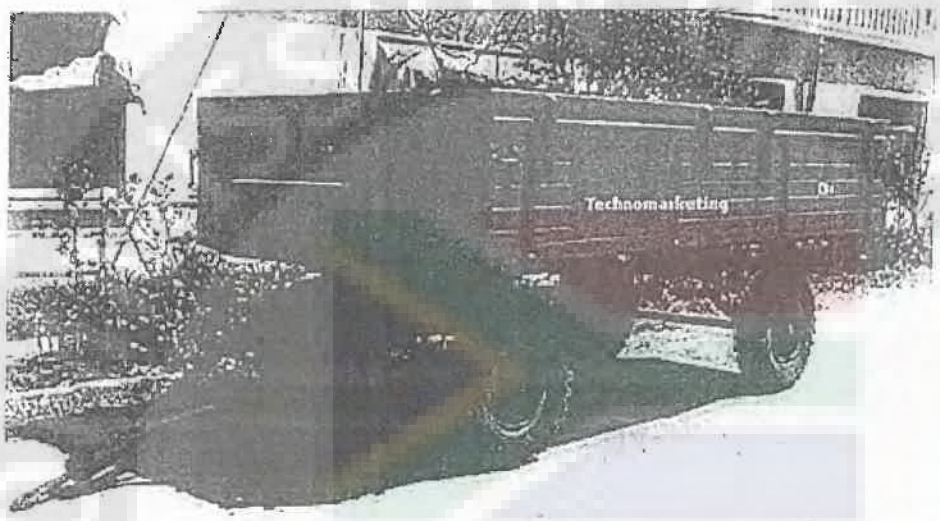
DAM-088

22. **Trailers (5-10 MT Capacity)**

- For transporting chopped green fodder from field to silage making site.
- Requirement 5 Nos.



23. **Trailer (hydraulic- self-unloading 5 MT)**

- To remove dungs and other residue from cattle shed.
- Requirement 3 No.

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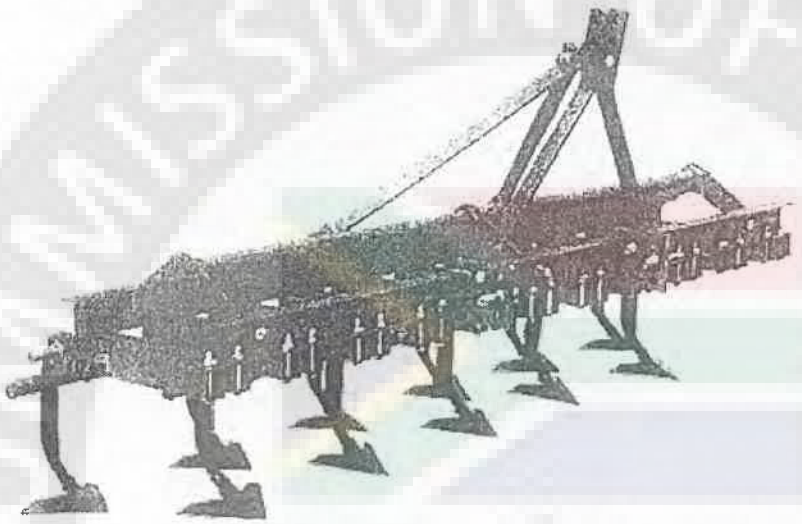
24. **Cultivator**

- For mechanical weed removal from the standing crop fields.
- Requirement 2 Nos.



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DAM-090

List of Agri Equipments required

Sl. No.	Machine	Model/Company	Status
1	Maize Planter 8 Row	JD 1750	New
2	Sprayer 2000 lt	Jacto	New
3	DTB	Rovic & Leers	New
4	Harrow 36 Discs		New
5	Harrow 28 Discs		New
6	Seed Bed Vipoflex		New
7	Hay baler Round	Class	New
8	Hay baler Square	Class	New
9	Rotary Cutter 6 pty	Khun	New
10	Rakes 5 wheels	Staal meester	New
11	Maize Harvestor grain	Case 6088	New
12	Maize harvestor green	JD 3975 2row	old
13	Trailer 10 MT		New
14	Feeder Wagon 12 cu. M	Keenan	New
15	Hay Bale Chopper	Drosky M16	New
16	Skid Steer	JCB	New
17	Fertilizer Spreader	Satra	New
18	Cultivator	Rovic & Leers	New
19	Mower Conditioner	Staal meester JFGCS320	New
20	Self-loading vagon		
21	Tedder		
22	TMR		
23	Manure Spreader		
24	Liquid Manure Spreader		
	Total		

Table: Approximate cost of agri-equipments.

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DAM-091

C. Tractors Requirement and their approximate cost

Power		Model	No.
KW	HP		
228	306	JD 8310R	2
160	215	JD 7215R	4
110	148	JD 6930	2
82	110	JD 6115B	8
54	72	JD 5424	5
TOTAL			**21**

This requirement is for 2000 cultivated land.
In first phase we are planning to cultivated around 1200 ha land, following requirement is for 1200 ha land (operation wise)

1. Harrowing
   - 228 kw 2 tractor
   - 160 kw 1 tractor

2. Seed Bed Preparation
   - 160 kw 2 tractor

3. Seeding and chemical placement
   - 160 kw 1 tractor

4. Fodder harvesting and chopping
   - 110 kw 1 tractor

5. TMR mixing
   - 110 kw 1 tractor

6. Fodder transportation from field to cattle shed
   - 54 kw 2 tractor

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DAM-092

7. Dung cleaning
   - 54 kw 1 tractor

8. Hay bales and silage transportation
   - 54 kw 1 tractor

Initial requirement of tractors for 1200 ha land cultivation and 500 animal feeding

Sl. No.	Power	Required No.
1	228 kw	2
2	160 kw	4
3	110 kw	2
4	54 kw	4
Total		**12**

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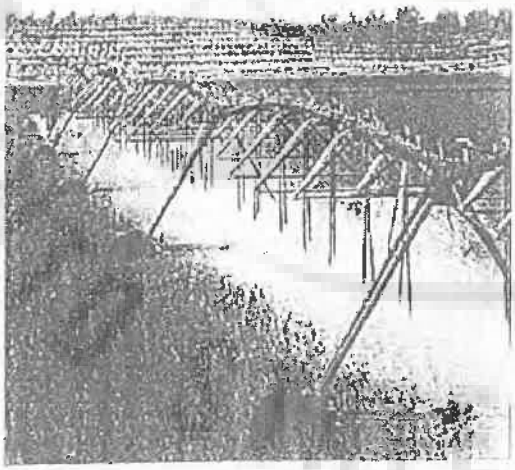
D. Irrigation water requirement

1. Irrigation Water Requirement

- Artificial requirement is required only in winter season (Jab to May)
- To irrigate around 400 ha land (3 cm each irrigation) in 120 days, 1200 million litre water is required.

2. A. Central Pivot Irrigation System

Centre pivot irrigation is a form of overhead sprinkler irrigation consisting of several segments of pipe (usually galvanized steel or aluminium) joined together and supported by trusses, mounted on wheeled towers with sprinklers positioned along its length. The machine moves in a circular pattern and is fed with water from the pivot point at the center of the circle. The outside set of wheels sets the master pace for the rotation (typically once every three days). The inner sets of wheels are mounted at hubs between two segments and use angle sensors to detect when the bend at the joint exceeds a certain threshold, and thus, the wheels should be rotated to keep the segments aligned. Center pivots are typically less than 1600 feet (500 meters) in length (circle radius) with the most common size being the standard 1/4 mile (400 m) machine. To achieve uniform application, center pivots require an even emitter flow rate across the radius of the machine. Since the outer-most spans (or towers) travel farther in a given time period than the innermost spans, nozzle sizes are smallest at the inner spans and increase with distance from the pivot point.



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B. Sprinkler irrigation

Sprinkler irrigation is a method of applying irrigation water which is similar to natural rainfall. Water is distributed through a system of pipes usually by pumping. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground. The pump supply system, sprinklers and operating conditions must be designed to enable a uniform application of water

Suitable crops

Sprinkler irrigation is suited for most row and field crops and water can be sprayed over or under the crop canopy.

Suitable slopes

Sprinkler irrigation is adaptable to any farmable slope, whether uniform or undulating. The lateral pipes supplying water to the sprinklers should always be laid out along the land contour whenever possible. This will minimize the pressure changes at the sprinklers and provide a uniform irrigation.

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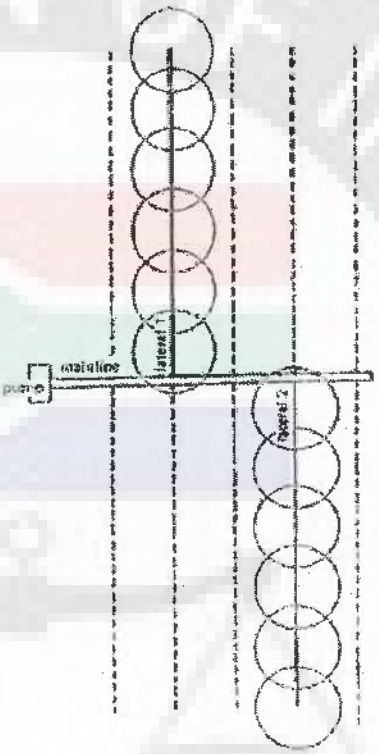
Sprinkler System Layout

A typical sprinkler irrigation system consists of the following components:

Pump unit
Mainline and sometimes sub mainlines
Laterals
Sprinklers



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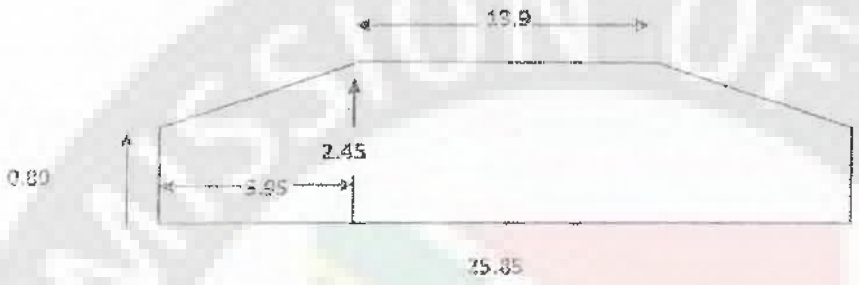
E. Silage Pit requirement

- To feed 500 adult unit of animal 5000 MT silage will be required.
- 15 silage pits (350 MT capacities) are required to fulfil the demand.



SILAGE PIT WIDTH 5.0 m

F. Agricultural chemical, fertilizer and seed

- For this season we are planning to cultivate 1200 ha land
- Nitrogen requirement @ 100 kg/ha = 120 MT
- Phosphorus @ 40 kg/ha = 48 MT
- Potash @ 40 kg/ha = 48 MT
- Above requirement are general requirement but actual requirement can be given only after soil sampling.
- In general cost of cultivation of Maize grain is as follows

For raising 1 ha maize grain

Sl. No.	Inputs	Cost In Rands
1	Seed Pioneer	1300
2	Fertilizers	3286
3	Plant protection chemicals	492
4	Man power	550
5	Diesel 120 lit	1320
6	Insurance	364
7	Other costs	300
	Total	7512

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Output 6 MT Maize grain @ 2732 Rand/MT (on 16/08/2012) = 16392 Rand

For raising 1 ha Soybean

Sl. No.	Inputs	Cost in Randa
1	Seed Pioneer	1500
2	Fertilizers	0
3	Plant protection chemicals	192
4	Man power	550
5	Diesel 120 lit	1320
6	insurance	364
7	Other costs	300
	Total	4526

Output 2 MT soybean grain @ 5500 Rand/MT (on 16/08/2012) = 11000 Rands

Some specific varieties for Free State

Sl. No.	Crop	Variety	Duration in Days
1	Yellow Maize	PHB 33H 56	<120
		PHB 32 D 99	<120
		PHB 3442	>120
2	Soybean	PHB 95 Y 20 R	>120
		PHB 95 Y 40 R	
		PHB 95 B 53 R	
3	Sunflower	PHB 65 A 25	>50

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Chapter 10. Fodder Preservation/ Fodder Bank

Preservation can be done by 2 methods

1. Hay
2. Silage

1. Hay

Hay is one form of conserved feed that can be fed to farm animals when other forms of forage are in short supply.

Hay is made from pastures during the summer months (November to February). Certain grass crops are grown specifically for hay conservation purposes, whereas grazed pastures could be mown for hay, should there be surplus growth. Hay can also be made from cowpeas and soybeans.

PASTURE SPECIES

Pasture species that could be used for making hay include the following.

Low rainfall areas (500 to 700 mm)

Weeping love grass (Eragrostis curvula)
Coastcross II (Cynodon species)
Rhodes grass (Chloris gayana)
Teff (Eragrostis teff)
Blue buffalo grass (Cenchrus ciliaris)
Guinea grass (Panicum maximum)
Lucerne (Medicago sativa)

All pastures, whether for grazing or hay making purposes, should be fertilised according to soil sample recommendations.

MACHINERY REQUIRED

The following tractors and machines could be used in the making of hay:

- Two, if not three tractors
- Mower
- Tedder
- Side-delivery rake
- Baler
- Trailers.

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Furthermore, it is usually necessary to store square bales under cover.

MAKING HAY

The aim of making good hay is to stop all life processes in the cut grass as quickly as possible. This is achieved by cutting the grass and then reducing the moisture content of the cut grass, as quickly as possible, to below 12 % to 15 % by exposing the cut grass to the sunshine.

Stage of growth at cutting

Grass should be mown when there is sufficient material to warrant the cost of mowing. However, it is important not to allow the hay crop to become too mature before mowing. The reason being that the feed value of the forage declines as the fibre content of the crop increases with age of regrowth.

Nutritious, high leaf content grasses are highly desirable for hay making purposes. Stems take longer to dry than do leaves and poor quality hay usually results from too much stemmy material relative to leaf material.

Hay making operations

It is important to reduce tractor operations to a minimum to reduce costs and soil compaction.

- Mow the pasture early in the morning. Cut only as much as can be handled, baled and stored in one day.
- Crimping or conditioning (possibly by means of a tedder) of freshly cut material speeds up drying, especially when hay is being made from succulent pastures.
- Windrow the cut material with a rake. Windrows allow for more rapid and more even drying.
- When there is 12 % to 15 % moisture left in the herbage, bale the material.
- Remove bales from the field. Square bales should be stored under cover (in a shed), while round bales should be stored in a convenient place off the pasture.

Note:

While crimping and conditioning speeds up the drying, or curing process, it is important to reduce the number of tractor operations to a minimum. Not only is "excessive handling" of the mown material expensive, in terms of tractor and implement costs, but it can also result in shattering of the material and in so doing can reduce the leaf content, and thus quality, of the hay.

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2. Silage

Silage is fermented, high-moisture fodder that can be fed to ruminants. It is fermented and stored in a process called ensiling or silaging, and is usually made from grass crops, including corn (maize), sorghum or other cereals, using the entire green plant (not just the grain). Silage can be made from many field crops, and special terms may be used depending on type (oatlage for oats, haylage for alfalfa.

Silage is made either by placing cut green vegetation in a silo, by piling it in a large heap covered with plastic sheet, or by wrapping large bales in plastic film. Good quality silage is yellowish-green in colour with a pleasant vinegar smell.

SILAGE MAKING EQUIPMENT

Provided the principles of silage making are understood, good silage can be made with any forage harvesting equipment. This may vary from self-loading wagons to the largest self-propelled precision chop machines.

Three possible combinations of machinery, together with the work rate of each, are given below.

System 1: for wilted high quality silage.

- Three to four tractors, depending on distance from the silo.
- Two reciprocating mowers (1.8 m) or 1 mower conditioner (2.7 m).
- One side delivery rake (optional).
- One precision chop forage harvester (interchangeable head allows for use with row crops).
- Two high-sided tip trailers; the sides should be wider apart at the delivery end to allow the cut pasture to slide off easily.
- One buck rake or front end loader, to spread the cut fodder in the bunker.
- Work rate: 4 ha/10 hour day, ensiling 43 t of 30 % dry matter silage.

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System 2: more mature pasture or pasture with additives, direct chopped.

- Three or four tractors as above.
- One forage harvester (flail or double chop).
- Two high-sided trailers, as above.
- One buck rake/front end loader, as above.
- Work rate: 7.3 ha/10 hour day, ensiling 80 t of 20 % dry matter silage.

System 3: for big bale silage.

Where big bale hay is already being made, small quantities of big bale silage can be made, in addition to the main silage programme, in a good year when surpluses occur.

- Two tractors.
- One mower conditioner which makes an even windrow necessary for big baling.
- One big baler with a variable size bale chamber.
- One spike adapter for buckrake/front end loader.
- One flatbed 4-wheel trailer, 8 to 12 big bale capacity.
- Work rate: 6.5 ha/10 hour day ensiling 72 t of 30 % dry matter silage or 150 bales stored.

Feeding the silage

The animals may not like its taste for the first few feedings. Help them to develop the taste by mixing 5 to 10 kg of silage in their green fodder ration for the first 5 to 6 days. After the taste is developed 20 to 30 kg of silage along with other fodders may be fed per head per day. Silage feeding is especially suited to milch cow as silage and concentrate ration produces more milk than straw and concentrate ration.

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Chapter 11. Pasture Development

- The growing heifers, dry cows, calves more than 6 month and other unproductive animals will be allowed for restricted grazing. No lactating cow will be allowed to grazing.

Certain types of pastures, if grown correctly, can supply the cheapest form of dry matter for dairy cows. Well managed pastures can supply economical protein and energy for both maintenance and production by the dairy cow.

In most of the bio climates of Free State there is no single pasture species that will grow well throughout the year. We have to plant those pasture species that will provide sufficient herbage for the cows for the summer period and to plant different species to provide for the winter months.

PASTURE SPECIES AND MIXTURES

The following pastures are the most popular for forage production during the summer months.

Kikuyu (Pennisetum clandestinum)

Coast cross II, also called K11, (Cynodon species)

Perennial ryegrass (Lolium perenne), in cooler areas

Tall fescue (Festuca arundinacea)

Kikuyu with red and white clover

Coast cross II with red and white clover

Perennial ryegrass with red and white clover

Tall fescue with red and white clover

Red clover in pure stand

White clover in pure stand.

For the spring, autumn and winter periods the following pastures are the most popular for dairy farming.

STATE CAPTURE

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Italian ryegrass (Lolium multiflorum)

Perennial ryegrass (Lolium perenne)

Italian ryegrass with red and white clover

Perennial ryegrass with red and white clover.

FEED VALUE

Summer period

Mediocre kikuyu pastures provide sufficient protein and energy for milking cow. Well-managed kikuyu could provide for a cow producing 14 to 16 litres of milk per day without the need for concentrate feed. Energy and protein, fed in the form of a concentrate, would be supplied to cows producing more than 16 litres of milk per day. In this case, however, it is imperative that there is sufficient well-managed kikuyu available to the dairy cow for both day and night grazing.

Winter period

Well-managed Italian ryegrass/clover has sufficient protein and energy for a Friesland cow to produce at least 18 litres of milk per day. Energy, in the form of concentrate would have to be provided to cows producing between 18 and 25 litres of milk per day. Cows producing more than 25 litres of milk per day would require extra energy and protein concentrate. It is important, however, that there is no restriction on intake of the ryegrass/clover pasture (i.e. there must always be sufficient pastures available to the cow).

POSSIBLE PASTURE FORAGE SYSTEMS FOR THE 250 COWS IN MILK DAIRY MODULE

System 1

200 ha of irrigated perennial ryegrass/clover

40 ha of dry land kikuyu

40 ha of dry land tall fescue/clover

40 ha of dry land tall fescue/clover for foggage

40 ha of dry land kikuyu for foggage.

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System 2

120 ha of irrigated Italian ryegrass/clover

80 ha of dry land kikuyu

40 ha of dry land tall fescue/clover

44 ha of dry land kikuyu for foggage.

"Foggage is a "loose" term used to refer to herbage that has been allowed to grow out during autumn and which is conserved on the land to be grazed when required during winter".

GRASS SPECIES	SEEDING RATE (kg/ha for 150 mm row planting)*
TROPICAL SPECIES	
Blue buffalo grass(*Cenchrus ciliaris*)	2 - 3 **
Rhodes grass (*Chloris gayana*)	8
"Kweek" (*Cynodon* spp.)	3
Smuts finger grass (*Digitaria eriantha*)	6 **
Weeping love grass (*Eragrostis curvula*)	2 - 3
Teff (*Eragrostis teff*)	10 - 12
Guinea grass (*Panicum maximum*)	7
Dallis grass (*Paspalum dilatatum*)	20 -30 **
Kikuyu (*Pennisetum clandestinum*)	2

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TEMPERATE SPECIES	
Oats (*Avena sativa*)	70
Cocksfoot (*Dactylis glomerata*)	20
Tall fescue (*Festuca arundinacea*)	25
Italian ryegrass: diploid (*Lolium multiflorum*)	20
Italian ryegrass: tetraploid (*Lolium multiflorum*)	30
Perennial ryegrass: diploid (*Lolium perenne*)	20
Perennial ryegrass: tetraploid (*Lolium perenne*)	30
LEGUMES	
Lucerne (*Medicago sativa*)	8
Red clover (*Trifolium pratense*)	5
White clover (*Trifolium repens*)	3

NOTES

1. Whenever legumes are used the recommended quantity of seed per hectare should be washed, inoculated with the correct bacteria and pelleted with pelleting lime. When grasses and legumes are mixed do not reduce the seeding rate of either species.

2. Purchase only certified seed and insist on an official certificate of purity and viability.

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For broadcast planting use from one and a half to twice as much seed as for row planting. Seeding rates for dry land plantings and for irrigation are the same in bio-climates 2, 3 and 4. In bio-climates 6, 8 and 10 seeding rates for dry land pastures can be reduced by 20 % and wider row-spacing (> 150 mm) used.

** For species thus indicated do not use fresh seed, rather use seed from the previous summer.

Grazing Plan

1. CONTINUOUS GRAZING

With continuous grazing the animals are placed in a camp at the beginning of the season and remain there for the entire grazing period of each year. The number of animals may be varied during the grazing season.

The advantages of continuous grazing include the following:

- Least management input of all the grazing systems.
- Least cost of all the systems with one boundary fence and possibly only one watering point.
- Least disturbance to animals since the animals do not need to be moved from one camp to another.
- Easy to keep grazing records.

Overgrazing Rotation needed

Since the animals are not moved from camp to camp, continuous grazing tends to lead to complacency and the animals often are not "seen" for extended periods, with the result that sick animals or animals in poor condition often are noticed only after the "poor" condition has become so severe that it has affected profitability.

Supervision of licks and water points is often neglected.

2. ROTATIONAL GRAZING

With rotational grazing there are a number of camps for each group of animals. The group of animals is moved from one camp to another, thus allowing a period of absence from each pasture area after it has been grazed.

Advantages ascribed to rotational grazing include:

- Uniform areas (soil, slope) are camped separately so that areas with different production potentials can be treated separately to maximise production.

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- Efficient utilisation of the pasture is possible because varying periods of stay or different sized camps can be used to attain the required degree of utilisation, or leader and follower herds can be used.
- Herbage of the desired quality (age of regrowth) can be offered to animals by adjusting the number of camps or the period of regrowth following utilisation.
- During periods of drought or slow growth of the pasture, herbage can be rationed to the animals.
- The adverse effects that may result from applying nitrogen (high nitrate nitrogen in the herbage or spilling of fertilisers) can be reduced.
- With irrigated pastures the adverse effects of pudding and footrot can be reduced by irrigating once the animals are removed from a camp.
- There is regular "informal inspection" of animals as they are moved from one camp to another and "unhealthy" animals can be spotted easily.

The disadvantages of rotational grazing include:

- Increased fencing and watering costs.
- Increased managerial time required.
- Application of fertiliser, and establishment of the pasture could be a problem with small areas (well designed electric fencing can help to alleviate these problems).
- Access, to each camp, by animals and machinery could be a problem.
- Increased labour is required to move stock and lick troughs.
- Compared with continuous grazing, animals are disturbed relatively frequently.

COMMONWEALTH OF AUSTRALIA
INTO STATE CAPTURE

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Chapter 12. Animal Nutrition

A. Cattle feed Factory

1. Hay Bale Chopper already discussed in Fodder Production chapter.
2. Skid steer
3. TMR mixture
4. Trailer for dung removal

Above machineries are already discussed in Fodder Production chapter.

5. Soybean extruder useful for remove anti nutritional factor.
6. Soybean crusher for crushing Maize and Soybean.
7. Grinder
8. Pallet Making Machine

B. Feeding of Lactating animals

Table : 1 Formula of Local farmers

			A		B	
Sl. No.	Ingredient	cost R/MT	Amt in kg	Cost in Rands	Amt in kg	Cost Rands
1	Green Fodder	250.00	0.00	0.00	0.00	0.00
2	Maize Silage	320.00	16.00	5.10	14.50	4.60
3	Sorghum Silage	250.00	0.00	0.00	7.40	1.90
4	Grass Hay	250.00	3.00	0.80	0.00	0.00
5	Lucerne Hay	1850.00	0.00	0.00	4.50	8.30
6	Soybean Hay	260.00	0.00	0.00	0.50	0.10
7	Corn Grain	2000.00	7.50	15.00	7.60	15.20
8	Full fat Soybean	3400.00	0.00	0.00	1.60	5.50
9	Soymeal	3200.00	0.00	0.00	0.00	0.00
10	High Protein Ration	7575.00	5.00	37.90	3.40	25.80
11	Cotton Seed Cake	3000.00	2.50	7.50	0.00	0.00
12	Citrus Pulp	1660.00	0.00	0.00	1.00	1.70
13	Molasses	1575.00	1.50	2.40	0.50	0.80
14	Mineral Mixture	50000.00	0.10	5.00	0.10	5.00
	TOTAL		35.60	73.60	41.10	68.90

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Feed Cost R/Day/Animal			73.6		68.9
Feed cost per lit milk	30 lit/day		2.45		2.30
Feed consumed for 1 lit milk			1.19		1.37
per kg TMR cost			2.07		1.68

Table: 3 ESTINA Feed Formula

			I		II	
Sl. No.	Ingredient	cost R/MT	Amt.kg	Cost R	Amt kg	Cost R
1	Green Fodder	250.0	0.00	0.00	25.00	6.30
2	Maize Silage	320.0	15.00	4.80	15.00	4.80
3	Sorghum Silage	250.0	0.00	0.00	0.00	0.00
4	Grass Hay	250.0	0.00	0.00	0.00	0.00
5	Lucerne Hay	1850.0	5.00	9.30	5.00	9.30
6	Soybean Hay	260.0	0.00	0.00	0.00	0.00
7	Corn Grain	2000.0	8.00	16.00	7.00	14.00
8	Full fat Soybean	3400.0	0.00	0.00	0.00	0.00
9	Soymeal	3200.0	8.00	25.60	8.00	25.60
10	High Protein Ration	7575.0	0.00	0.00	0.00	0.00
11	Cotton Seed Cake	3000.0	0.00	0.00	0.00	0.00
12	Citrus Pulp	1660.0	0.00	0.00	0.00	0.00
13	Molasses	1575.0	1.50	2.40	0.00	0.00
14	Mineral Mixture	50000.0	0.10	5.00	0.10	5.00
	TOTAL		37.60	63.00	60.10	64.90

Feed Cost R/Day/Ani			63.00		64.9	63.7
Feed cost per lit milk	30 lit/day		2.10		2.16	2.09
Feed consumed for 1 lit milk			1.25		2.00	1.00
per kg TMR cost			1.68		1.08	2.10

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Note:

- The cost of feed ingredients is variable at different places however to make the above feed formula understable, the cost of ingredients have assumed similar.
- The cost of above feed ingredients is as per the information collected from local dairy producers.
- Since in first year or initial stage the purchased animals will be either in advance pregnancy or in lactating stage. So their feeding schedule will be almost same.

C. Annual requirement for Cattle feed ingredient

Sl. No.	Ingredient	Per day in kg	Annual kg	Annual in MT
1	Green Fodder	25.0	2250000	2250
2	Maize Silage	15.0	2737500	2737.5
3	Sorghum Silage	0.0	0	0
4	Grass Hay	0.0	0	0
5	Lucerne Hay	5.0	912500	912.5
6	Soybean Hay	0.0	0	0
7	Corn Grain	7.0	1277500	1277.5
8	Full fat Soybean	0.0	0	0
9	Soymeal	8.0	1460000	1460
10	High Protein Ration	0.0	0	0
11	Cotton Seed Cake	0.0	0	0
12	Citrus Pulp	0.0	0	0
13	Molasses	0.0	0	0
14	Mineral Mixture	0.1	18250	18.25
0	TOTAL	60.1		8655.75

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D. Annual Water Requirement for Cattle

Water is the main constituent of the animal's body, constituting 50 to 80 percent of the live weight, depending on age and degree of fatness. An animal can lose almost all of its fat and about 50 per cent of its body protein and survive. However, the loss of 10 per cent of its body water can be fatal. A good water supply is defined both in terms of quantity and quality of the water. A good water supply is important because total water intakes are positively related to feed dry matter (DM) intakes.

Water Sources

The four main functions of water in the body are:

- To help eliminate waste products of digestion and metabolism (faeces of healthy cattle often contain 75 to 85 per cent water)
- To regulate blood osmotic pressure.
- A major component of secretions (milk and saliva) as well as in the products of conception and growth.
- In the body's thermoregulation as affected by evaporation of water from the respiratory tract and from the skin's surface.

Cattle fulfil their needs for water from three major sources

- Free drinking water from natural resources.
- Water contained in feed.
- Metabolic water produced by metabolic activities

The first two are sources of major concern in the management of livestock. Because of the large variation in water intakes, an estimate of water intake of cattle should be made based on production factors, which affect water intake. Water consumption requirements depend on factors such as:

- kind and size of animal
- rate and composition of gain
- pregnancy
- lactation
- type of diet
- level of dry matter intake
- level of activity
- quality of water & temperature of the water offered
- surrounding air temperature

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Water is also required for cleaning of cattle shed, cleaning of cattle and milking parlour. Water requirement is given in following table

Sl. No.	Type of Animal	Drinking Water req.ltr/day	No. of Animals in 2nd year	Total Req. liter
1	3-6 month old calves	10	120	1200
2	7-12 month old calves	25	80	2000
3	Dry cows	50	- ?	
4	Pregnant cows	125	200	25000
5	Lactating cows	200	300	60000
Total				88200

x 365
= R32,2 million.

Besides the drinking water a lot of water will be required to clean the animal sheds, milking parlour, milking machine and reproduction and clinical units.

Chapter 13. Workshop Equipment

To maintain the tractors, agri equipment and some dairy equipment, there must be a well-equipped workshop. To establish a workshop list of some important tools and equipment is given below

1. Air Compressor
2. Oil filling equipment & Grease equipment
3. Waste oil handling equipment
4. Pneumatic fluid extractor
5. Battery charger
6. Tool boxes
7. Oil hand pump
8. Heavy duty drill machine
9. Welding machine gas and electric
10. Grinders portables and fixed
11. Iron cutter
12. Different sized jacks- hydraulic and manual
13. Tractor tyre changer
14. Weighing machine (50 MT capacity)
15. Tractor and machine washing system
16. Chain pulley cranes & Trolleys
17. Miscellaneous tools

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Economic Impact for the Local Community and Province

Economic Impact of the 500-cow Dairy Construction

The bulk of the costs represent investments in construction of a Milking Parlor, freestall barn, holding area, bunker silo, manure storage and water supply. Additionally, at least R200m worth of machinery will be purchased for the dairy operation and Processing Plant. A significant portion of this amount will be spent locally for contractors, specialized labor, building supplies for constructing the dairy and for purchasing equipment. → Mostly imported

Farm Level Annual Economic Impact of the 500-cow Dairy Operation

- The dairy will generate at least R320 million in gross revenue per year for over the next 6 years
- An estimated R50 million in economic activity will be generated annually in the state due to the multiplier effect of the annual expenditures of the dairy. Most of that economic activity will be generated in the surrounding rural area. For every Rand spent by the dairy, approximately R2.50 in business purchases and wages are created in the state's economy.
- The dairy will spend R50,000 per year in insurance fees
- The dairy will spend R500,000 per year in utilities, fuel and oil
- The dairy will provide direct employment to 20 full-time positions such as a dairy manager, herdsman, milkers, feeders and others.
- Indirect jobs in the community supported by dairy operation include: equipment repair and maintenance, insurance, banking, custom manure hauling, dairy supplies, and veterinary services.
- The dairy will provide local crop producers with a new market for their crops;
- Nutrient management from the dairy will help local landowners save R240 – R480 per acre in reduced fertility costs by the use of dairy manure.

Why then have own operation?
→ Need more comprehensive outline of farm level impact.

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DAM-114

Financial Implications of the Project

1. **Industry Analysis:**

The Dairy Industry in South Africa is well developed but presently centralised in the hands of 2-3 companies with hardly any competition in the market resulting in abnormal profits. The promoter realised the scope and opportunity and decided to go for a medium size dairy project with backward integration of dairy farm, cattle farming, production of cattle feed and farming. The project is likely to grow gradually in size over a period of time. The dairy project shall be equipped with all the latest Milk Parlour equipment.

The Project is located at Vrede which is in the municipal district of Phumelela in the Free State province of South Africa. 3368 hectares (ha) of land has already been acquired in this regard.

The Project will initially start with 500 milking cows and an agricultural farming on 1500 ha to produce sufficient grains and hay to meet the feeding requirements of the cows. The Project will then be expanded to include 500 cows which will be donated to the Community members. The milk produced by these community members will be bought back by Estina and a complete end-to-end support will be provided to the local farmers thus empowered.

2. **Business Experience of Partners / Directors/ Key Persons:**

The promoter of the company is associated with Paras, the largest private milk producer in India, who are assisting in deploying this project through their offices in the Middle East. Currently 5 full-time resources have already been deployed on the project and additional team members are on-call as and when their expertise is required. Brief particulars of some of the team members on site are appended below for information:

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a. **Mr. CP Yadav**. Mr. Yadav is the Head of the Project. He is an ex-Indian Administrative Service officer and has served at several key administrative positions with the Government of India, including but not limited to the Agriculture Production Commissioner and ensured coordination among more than 20 departments related to Agriculture Production and Rural Development. His detailed CV is enclosed.

b. **Dr. R. J. Sharma**: Dr. Sharma is a recognized technocrat in the field of Agriculture and allied activities. He is ex-Dean, College of Veterinary & Animal Science, G.B. Pant Univ. of Ag. & Tech. Pantnagar. He has experience of more than 36 years in the field of extension, research, teaching and administration in different capacities while working in G.B. Pant University of Agriculture & Technology, Pantnagar. He has been engaged in basic as well as applied research on various aspects of dairy and draught animals, poultry, rabbitry, piggery, goatry, sheep production, fodder crops and pasture development. He was involved directly in more than 30 research projects carried out on various aspects of livestock species and fodder production and handled two ICAR (Indian Council for Agricultural Research) projects. He also held the post of Joint Director of Instructional Dairy & Poultry farms. His detailed CV is enclosed.

c. **Mr. P B Yadav**: Mr. Yadav is M.Sc.Ag (Agronomy) from college of agriculture, G.B. Pant University of Agriculture & Technology, Pantnagar. He is a young and energetic agriculturist with more than 5 years' experience in Agronomy and Horticulture. His detailed CV is enclosed.

local expertise ?

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Break-down of Project costing for the Dairy Unit:

DAIRY FARM COSTING

FIXED & WORKING CAPITAL	UNITS	BUDGET VALUE
Irrigation & mechanisation	1,000 ha	R45,000,000
Rain fed mechanisation	1,350 ha @ R20,000	R27,000,000
Dairy cattle – "Cows in Milk" (CIM)	500 ea @ R25,000	R12,500,000
Dairy cattle – Rest of herd (Followers)	500 ea @ R25,000	R12,500,000
Dairy bulls / AI		R600,000
Milking parlour – 1,000 CIM unit	1,000 ea @ R5,000	R5,000,000
Bulk cooling tanks		R25,500,000
Dairy products manufacturing		R14,000,000
Pasteurizer		R60,000,000
Feedlot		14,000,000
Other dairy equipment		R15,000,000
Animal Feed Plant		R10,000,000
Grain & oilseed mill		R19,000,000
D/Working Capital requirement		R35,000,000
Total Funding Required	**Excluding VAT**	**R300,000,000**
To be funded by	**Dept. of Agriculture**	**R300,000,000**

? Loan ?

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DAIRY PROCESSING PLANT COSTING

FIXED & WORKING CAPITAL	UNITS	BUDGET VALUE
UHT Long Life Milk Plant		R143,000,000
Dairy Products Manufacturing		R46,000,000
IP/Working Capital Requirement		R5,000,000
Total Funding Required	**Excluding VAT**	**R200,000,000**
To be funded by	**Estina**	**R200,000,000**
TOTAL PROJECT VALUE	**EXCLUDING VAT**	**R500,000,000**

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COMMISSION OF INQUIRY INTO STATE CAPTURE

FINANCIAL PERFORMANCE:

Detailed Statement of Projected Profit & Loss and Income Statement enclosed as Appendix 1

Cash flow ?

Comments on Financial Performance:

Project Assumptions used in the financial Projections are as follows:

a. No. of Cows: 500
b. Average milk yield per cow per day: 45 litres;
c. Total milk production per day: 22,500 litres
d. Total Milk produced yearly (320 days): 7,200,000 litres
e. Pasteurised Milk Produced yearly (69%): 4,968,000 litres;
f. Value Added Milk (25%): 1,800,000 litres;
g. Butter & Cream: 124,200 kg;
h. Selling Rate:
* Pasteurised Milk: R8.00 per litre;
* Value Added Milk: R12.00 per litre;
* Butter & Cream: R40.00 per kg
i. Cultivation Area: 1500 ha;
j. Total cost of Production of milk: R2.35 per litre (Detailed sheet enclosed).
k. Creditors: 15 days;
l. Debtors: 45 days;
m. Stock: 15 days;
n. Cows to increase to 550 in 2014-15 & to 600 in 2015-16.

Sales/Income:

The dairy shall start producing milk only from around April-May 2013. Therefore for 2013-14 the sales have been conservatively estimated to be for 9 months only. From 2014-15 onwards, full operating years will commence, with a total sale of R66.31mm. The sales are likely to increase by 10% to R72.94 mm due to adding of another 50 cows from the year 2016-17 as the heifer cows will start milking. The sale proceeds from the extra agricultural produce (Maize, Soybean, Hay etc) left after production of animal feed or the extra animal feed produced has not been taken into consideration. The milking cows will replace the cows which become dry on a regular basis. The female calves shall be retained by the dairy and dried cows and male calves shall be sold. The assumptions above are made conservatively and are realistic and achievable.

Not in line with psc

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Net Profit:

It would take 13 to 14 months for the dairy to become operational. This would result into a loss of R8.48 Mn in 2012-13 and R1.83 Mn in 2013-14. However, due to availability of land and backward integration the expenses on animal feed will be very low. Further, the agricultural production is likely to be more than the requirement for the animal feed. It is likely to generate additional income to increase the profitability. However, we have not considered it. It is therefore expected that in the very 1st year of full operations sufficient profit shall be generated to wipe out the initial accumulated losses. The Company has not forecasted any dividend during the currency of Bank finance. The PBDIT/Sales hovering around 70% and PBT/Sales is always more than 40% which reflects health profitability.

Conclusion

The following additional factors make a sound business case for the Project to succeed

a) There is a large scope for a dairy project in South Africa as presently the market is controlled by few companies which are making abnormal profits.
b) In South Africa the land is easily available and agriculture and farming is highly developed and modernised. Cattle farming is more evolved in meat production rather than dairy because the present dairy owners having the monopoly are exploiting the farmers and not giving them the reasonable price for the milk. So in case of any eventuality the milk can be procured from the local farmers at reasonable prices.
c) Land has already been acquired for implementing the project as well as the backward integration.
d) The Company is managed by the professionals and experienced people with long experience in this this line of activity.
e) Funding for the Project has already been committed to, both by the Department as well as the Promoters.

Appendix I enclosed

*** End of Report ***

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CONFIDENTIAL STATE CAPTURE

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VREDs DAIRY PROJECT - APPENDIX 1						
	ALL FIGURES ARE IN ZAR					
PARTICULARS	Projections	Projections	Projections	Projections	Projections	Projections
Years	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Operating months	5	9	12	12	12	12
Operating Statement						
Domestic Sale	-	22,104,960	66,312,000	72,943,200	79,574,400	79,574,400
Total Gross Sales	-	22,104,960	66,312,000	72,943,200	79,574,400	79,574,400
Less: Excise Duty						
Net Sales (1-2)	0	22,104,960	66,312,000	72,943,200	79,574,400	79,574,400
Growth in sales	0%	#VALUE!	200%	10%	9%	0%
Cost of Sales						
Raw Material	7,057,500	8,587,500	8,587,500	8,587,500	9,446,875	9,247,219
Direct Labour	800,000	2,400,000	2,400,000	2,400,000	2,520,000	2,646,000
Repairs and maintenance		600,000	600,000	600,000	726,000	798,600
Other Mfg. Expenses		500,000	500,000	500,000	550,000	550,000
Depreciation		6,750,000	6,750,000	6,750,000	6,750,000	6,750,000
Others expenses	625,000	5,790,000	5,790,000	5,790,000	6,294,000	6,514,000
Misc. expenses	175,000	250,000	250,000	250,000	300,000	300,000
Electricity & Water	500,000	2,000,000	2,000,000	2,000,000	2,200,000	2,420,000
Harvesting Cost		2,540,000	2,540,000	2,540,000	2,794,000	2,794,000
Packaging/Transportation Cost		500,000	1,000,000	1,000,000	1,000,000	1,000,000
Sub Total	8,482,500	23,927,500	24,427,500	24,487,500	25,646,875	26,505,819
Add Opening Stock	-		390,000	390,000	390,000	420,000
Sub Total	8,482,500	23,927,500	24,817,500	24,877,500	26,036,875	26,925,819
Deduct: Closing Stock	-	390,000	390,000	390,000	420,000	420,000
Cost of Production	8,482,500	23,537,500	24,427,500	24,487,500	25,616,875	26,505,819
Sub Total (Total Cost of Sales)	8,482,500	23,937,500	24,427,500	24,487,500	25,616,875	26,505,819
Gross profit	-8,482,500	-1,832,540	41,884,500	48,455,700	53,957,525	53,068,581
Gross Profit/Sales	0.00%	-8.29%	59.16%	66.43%	67.81%	66.69%
Selling Expenses	0	1,000,000	1,100,000	1,210,000	1,331,000	1,464,100
Administrative Expenses	-	892,500	892,500	981,750	1,079,925	1,187,918
Sub Total	8,482,500	4,415,000	26,420,000	26,679,250	28,827,800	29,157,836
Operating Profit before Interest	-8,482,500	300,000	39,892,000	46,263,950	51,546,600	50,416,564
a. Interest on CC						
b Interest on TL	-	-	-	-	-	-
c Other interests	-	-	-	-	-	-
Total Interest Paid	-	-	-	-	-	-
Interest Income						
Net Finance Cost/Income (-)	-	-	-	-	-	-
Operating Profit after Interest	8,482,500	300,000	39,892,000	46,263,950	51,546,600	50,416,564
Add: Other non operating income						
Sub Total	0	0	-	-	-	-
Deduct other non operating expenses						
Interest (Dividend/Royalties etc..	0	0	-	-	-	-
Other Expenses		0	-	-	-	-
Intangibles written off -1			-	2,500,000	2,500,000	2,500,000
Sub Total	0	0	-	2,500,000	2,500,000	2,500,000
Net of other non operating income/(Expenses)	0	0	-	-2,500,000	-2,500,000	-2,500,000
Profit before Tax /Loss (PBT)	-8,482,500	300,000	39,892,000	43,763,950	49,046,600	47,916,564
Provision for Taxes			3,756,659	10,253,906	13,733,048	13,416,638
Net Profit/Loss (PAT)	-8,482,500	300,000	36,135,341	33,510,044	35,313,552	34,499,926
Cash Accruals	-8,482,500	7,050,000	42,885,341	40,260,044	44,563,552	43,749,926
Dividend paid (if any) Dividend			25,000,000	25,000,000	30,000,000	30,000,000
Retained Profit	-8,482,500	300,000	11,135,341	8,510,044	5,313,552	4,499,926
Retained Cash Profits	-8,482,500	7,050,000	17,885,341	15,260,044	13,563,552	13,749,926
Bid Cost as % sales	0%	37%	0	0	0	0
PBDIT	0.00	7,050,000	46,642,000	53,513,950	59,796,600	58,666,564
PBDIT/Sales	0.00%	31.89%	70.34%	73.35%	75.12%	73.70%
Operating Profit/Sales	0.00%	1.36%	60.16%	63.42%	64.78%	63.36%
PBT/Sales	0.00%	1.36%	60.16%	60.00%	61.61%	60.22%
PAT/Sales	0.00%	1.36%	54.49%	45.93%	44.36%	43.36%
Cash Accruals/ Sales	0.00%	31.89%	64.67%	55.18%	55.97%	54.96%

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