

LOAN AMORTISATION TABLE

Enter Values	
Loan Amount	\$ 652,827.83
Annual Interest Rate	7.50 %
Loan Period in Years	10
Number of Payments Per Year	1
Start Date of Loan	1/1/09
Optional Extra Payments	\$ -

Loan Summary	
Scheduled Payment	\$ 95,107.83
Scheduled Number of Payments	10
Actual Number of Payments	10
Total Early Payments	-
Total Interest	\$ 298,250.45

Lender Name: CEDA

PmtNo.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance
1	1/1/10	\$ 652,827.83	\$ 95,107.83	\$ -	\$ 95,107.83	\$ 46,145.74	\$ 48,962.09	\$ 606,682.09
2	1/1/11	606,682.09	95,107.83	-	95,107.83	49,606.67	45,501.16	557,075.42
3	1/1/12	557,075.42	95,107.83	-	95,107.83	53,327.17	41,780.66	503,748.24
4	1/1/13	503,748.24	95,107.83	-	95,107.83	57,326.71	37,781.12	446,421.53
5	1/1/14	446,421.53	95,107.83	-	95,107.83	61,626.21	33,481.62	384,795.32
6	1/1/15	384,795.32	95,107.83	-	95,107.83	66,248.18	28,859.65	318,547.14
7	1/1/16	318,547.14	95,107.83	-	95,107.83	71,216.79	23,891.04	247,330.35
8	1/1/17	247,330.35	95,107.83	-	95,107.83	76,558.05	18,549.78	170,772.30
9	1/1/18	170,772.30	95,107.83	-	95,107.83	82,299.90	12,807.92	88,472.40
10	1/1/19	88,472.40	95,107.83	-	88,472.40	81,836.97	6,635.43	0.00

TECHNICAL GUIDE FOR ESTABLISHING A PIGGERY PROJECT

INTRODUCTION

The pig industry in Botswana plays an important role in improving the standard of living by creating employment opportunities, providing a source of food and generating income. The pig industry is still at its infancy stage. During 2006/2007 the pig population was 12 881 vis-a vis the total country's requirement of approximately 17 711. There are 143 pig projects country wide and out of these pig projects, 142 (99%) are small scale projects with 10 to 20 pigs and only 1 project (1%) is a large scale holding with over 200 sow units. It was estimated that Botswana's total pork and bacon consumption was 1496 tons annually. The industry employed 143 people (**The Piggery Annual Report of 2006/2007**). Pig production is the raising of pigs primarily for the production of pork and/or bacon. In Botswana there are two systems of production: commercial and subsistence. However, the emphasis here is put on commercial pig production.

The recommended types of breed

Three (3) major pig breeds that perform well under Botswana's harsh climatic conditions are the large white, landrace and duroc. Most farmers prefer them as first-cross dams in commercial herds because of the following attributes;

- They are highly productive and capable of producing 16 piglets twice in a year
- Their carcasses have more meat
- They attract higher prices at the market
- They have faster leaner growth.
- They are efficient use of feed and
- They have good maternal and paternal attributes

PREREQUISITES

Before setting up commercial pig production, the following are key prerequisites:

- Land
- Water
- Managerial skills and experiences
- Market and;
- Capital.

Land

The piggery project requires a gentle sloppy site with well draining soils (e.g. loamy soils) to enable easy flow of effluence. The plot should be 1 kilometer away from the rivers to avoid possible contamination of water from effluence. Assessment on the suitability of the plot for pig production should be conducted. A land measuring 100m x 100m is recommended to accommodate buildings and structures such as;

- Dry sow area/pen
- Farrowing unit/pen
- Weaner pens
- Growers and finishers' area/pen
- Boar service pen
- Storeroom and office area.

Water

There should be a reliable source of clean water that can be used for both human and animal consumption, such as boreholes, rivers and dams. In case of inadequate water source, a reservoir could be constructed.

Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
500,722.20	550,794.42	605,873.86	666,461.25	733,107.37	806,418.11	887,059.92
2,703,899.88	2,974,289.87	3,271,718.85	3,598,890.74	3,958,779.81	4,354,657.80	4,790,123.58
79,860.00	87,846.00	96,630.60	106,293.66	116,923.03	128,615.33	141,476.86
4,924.70	5,417.17	5,958.89	6,554.78	7,210.25	7,931.28	8,724.41
3,289,406.78	3,618,347.46	3,980,182.20	4,378,200.42	4,816,020.47	5,297,622.51	5,827,384.76
Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
3,289,406.78	3,618,347.46	3,980,182.20	4,378,200.42	4,816,020.47	5,297,622.51	5,827,384.76
8,556,886.58	12,175,234.04	16,155,416.24	20,533,616.67	25,349,637.13	30,647,259.65	36,474,644.41
1,520,530.47	1,672,583.52	1,839,841.87	2,023,826.05	2,226,208.66	2,448,829.52	2,693,712.48
57,326.71	61,626.21	66,248.18	71,216.79	76,558.05	82,299.90	81,836.97
1,711,549.60	1,884,137.73	2,074,092.16	2,283,157.58	2,513,253.76	2,766,493.08	3,051,835.32
14,887.68	14,887.68	14,887.68	14,887.68	14,887.68	14,887.68	14,887.68
1,696,661.92	1,869,250.05	2,059,204.48	2,268,269.90	2,498,366.07	2,751,605.40	3,036,947.64
37,781.12	33,481.62	28,859.65	23,891.04	18,549.78	12,807.92	6,635.43
1,658,880.80	1,835,768.43	2,030,344.83	2,244,378.86	2,479,816.30	2,738,797.48	3,030,312.21
248,832.12	275,365.26	304,551.72	336,656.83	371,972.44	410,819.62	454,546.83
1,410,048.68	1,560,403.17	1,725,793.10	1,907,722.03	2,107,843.85	2,327,977.86	2,575,765.38
3,289,406.78	3,618,347.46	3,980,182.20	4,378,200.42	4,816,020.47	5,297,622.51	5,827,384.76
1,668,748.36	1,835,418.45	2,018,755.55	2,220,426.36	2,442,264.25	2,686,285.92	2,954,709.77
1,620,658.42	1,782,929.00	1,961,426.65	2,157,774.07	2,373,756.22	2,611,336.59	2,872,675.00
105,675.36	105,675.36	105,675.36	105,675.36	105,675.36	105,675.36	99,039.93
3,700,414.77	5,377,668.41	7,233,419.70	9,285,518.40	11,553,599.26	14,059,260.49	16,832,895.55
163,105.58	177,722.62	193,801.37	211,487.99	230,943.27	252,344.08	275,884.98
1,520,530.47	1,672,583.52	1,839,841.87	2,023,826.05	2,226,208.66	2,448,829.52	2,693,712.48
704	774	852	937	1031	1134	1247
1,197.90	1,317.69	1,449.46	1,594.40	1,753.85	1,929.23	2,122.15
330	327	324	322	319	317	315
779.46	856.62	941.50	1,034.87	1,137.57	1,250.54	1,374.81

FINANCIAL PROJECTIONS (CONTINUED)

Revenue/Income					
	Weight (kg)	Price/kg or head	Year 0	Year 1	Year 2
Pigs sold: Baconers	110	15.00	0.00	344,850.00	455,202.00
Porkers	60	15.00	0.00	1,862,190.00	2,458,090.80
Culled sows		1,250.00	0.00	66,000.00	72,600.00
Culled boars		1,850.00	0.00	4,070.00	4,477.00
Total Revenue/Income			0.00	2,277,110.00	2,990,369.80
Summary of Profit & Loss Statement					
Loan Assumptions @100%					
			Year 0	Year 1	Year 2
Return on sales			0.00	2,277,110.00	2,990,369.80
Cummulative Benefits			0.00	2,277,110.00	5,267,479.80
Operational Variable costs			187,859.35	1,230,617.77	1,382,300.43
Loan Repayments Principal			46,146.74	49,606.67	53,327.17
Gross Benefits (PBDIT)			-234,006.09	996,885.56	1,554,742.20
Depreciation			0.00	14,887.68	14,887.68
Gross Benefits (PBIT)			-234,006.09	981,997.87	1,539,854.52
Loan Repayments interest			48,962.09	45,501.16	41,780.66
Gross Benefits (PBT)			-282,968.18	936,496.72	1,498,073.86
Taxation (15% of PBT)			-42,445.23	140,474.51	224,711.08
Net Benefit Flow (PADIT)			-240,522.95	796,022.21	1,273,362.78
Summary of Cashflow					
Total Cash inflow			652,827.83	2,277,110.00	2,990,369.80
Total Cash outflow			652,827.83	1,353,467.25	1,517,230.10
Net Cashflow			0.00	923,642.75	1,473,139.70
Loan Repayment			0.00	105,675.36	105,675.36
Cummulative Cashflow			0.00	817,967.39	2,185,431.72
Summary of Breakeven					
Fixed cost			220,257.48	137,737.16	149,817.36
Total variable cost			187,859.35	1,230,617.77	1,382,300.43
Total variable cost per sow unit			87	570	640
Unit price			900.00	990.00	1,089.00
Break-even piglets			271	328	334
Break-even price			188.94	633.50	709.31
Break even average piglets			354		
Break even average price			989.68		

Management skills and experience

The farmer should have basic skills and experience in pig management as this enhances business sustainability and competitiveness. It is important for the farmer who does not possess the relevant skills to undergo an intensive training course in pig husbandry.

Market(s)

To ensure freshness of the products after slaughter, the farmer should identify and locate the project within the vicinity of market outlets such as food processors, local butcheries, retailers, hotels, wholesalers and individual consumers.

Capital

For a profitable pig project, access to finance is important as it enables the farmer to implement the business idea and acquire farm equipment and inputs. Therefore, this requires the farmer to identify potential funding sources.

FARMING SYSTEMS

The two types of pig production systems used in Botswana are: (1) feeder operation or weaner scheme and (2) farrow to finish operation (breeding scheme).

Weaner scheme

This is where weaners weighing 20kgs are purchased and fed to market weight of 45 -70kg and 71 – 110kgs in the case of porkers and baconers respectively. This scheme does not require high levels of pig management skills. In addition, the system requires the farmer to have guaranteed supply of weaner pigs.

Breeding scheme

The system involves raising of pigs from birth until they are ready for market. This operation is labour intensive and requires high level of management skills. In addition, the farmer should have reliable market outlets.

MANAGEMENT PRACTICES

The success of any business endeavor depends on the management practices adopted. The following practices should be carried out in pig production:

- Administration of iron injection
- Clipping
- Docking
- Castration at the age of 3 weeks
- Deworming (deworm pregnant sows 7-14 days before moving to farrowing house).
- Flushing
- Feeding
- Weaning at 8 weeks
- Culling
- Breeding/mating
- Records management

The greatest production performance of the pig project depends on the following;

- Constructing appropriate housing structures
- High levels of gilts production
- Servicing gilts well on time
- Maintaining high levels of hygiene in the farrowing house
- Maintain gilts production records to help in making sound decisions

Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	
95832	105415	115957	127552	140308	154338	169772	
5856.4	6442	7086	7795	8574	9432	10375	
2,047.48	2,047.48	2,047.48	2,047.48	2,047.48	2,047.48	2,047.48	
23,958.00	26,353.80	28,989.18	31,888.10	35,076.91	38,584.60	42,443.06	
19,166.40	21,083.04	23,191.34	25,510.48	28,061.53	30,867.68	33,954.45	
0	0	0	0	0	0	0	
0	0	0	0	0	0	0	
1357.62	1493.38	1642.72	1806.99	1987.69	2186.46	2405.11	
12.00	12.00	12.00	12.00	12.00	12.00	12.00	
200.00	200.00	200.00	200.00	200.00	200.00	200.00	
22.00	22.00	22.00	22.00	22.00	22.00	22.00	
62.00	62.00	62.00	62.00	62.00	62.00	62.00	
2.40	2.40	2.40	2.40	2.40	2.40	2.40	
280.00	280.00	280.00	280.00	280.00	280.00	280.00	
375.00	375.00	375.00	375.00	375.00	375.00	375.00	
1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	
1,480.75	1,480.75	1,480.75	1,480.75	1,480.75	1,480.75	1,480.75	
309.60	309.60	309.60	309.60	309.60	309.60	309.60	
3,807.65	3,807.65	3,807.65	3,807.65	3,807.65	3,807.65	3,807.65	
283.80	283.80	283.80	283.80	283.80	283.80	283.80	
12.90	12.90	12.90	12.90	12.90	12.90	12.90	
156.25	156.25	156.25	156.25	156.25	156.25	156.25	
4,333.33	4,333.33	4,333.33	4,333.33	4,333.33	4,333.33	4,333.33	
50.00	50.00	50.00	50.00	50.00	50.00	50.00	
1,800.00	1,800.00	1,800.00	1,800.00	1,800.00	1,800.00	1,800.00	
700.00	700.00	700.00	700.00	700.00	700.00	700.00	
14,887.68	14,887.68	14,887.68	14,887.68	14,887.68	14,887.68	14,887.68	14,887.68
163,105.58	177,722.62	193,801.37	211,487.99	230,943.27	252,344.08	275,884.98	
8,784.60	9,663.06	10,629.37	11,692.30	12,861.53	14,147.69	15,562.45	
77.13	84.84	93.33	102.66	112.93	124.22	136.64	
216453	238098	261908	288098	316908	348599	383459	
13603	14963	16459	18105	19916	21907	24098	
355626	391189	430308	473338	520672	572739	630013	
30590	33649	37013	40715	44786	49265	54191	
254913	280404	308445	339289	373218	410540	451594	
560248	616273	677900	745690	820259	902285	992514	
57440	63184	69503	76453	84099	92508	101759	
8050	8855	9740	10714	11786	12964	14261	
432.58	475.83	523.42	575.76	633.33	696.67	766.33	
732.05	805.26	885.78	974.36	1,071.79	1,178.97	1,296.87	
8,864.46	9,750.91	10,726.00	11,798.60	12,978.46	14,276.30	15,703.93	
111.80	122.98	135.28	148.81	163.69	180.06	198.07	
93.17	102.49	112.74	124.01	136.41	150.05	165.06	
1,197.90	1,317.69	1,449.46	1,594.40	1,753.85	1,929.23	2,122.15	
878.46	966.31	1,062.94	1,169.23	1,286.15	1,414.77	1,556.25	
1,078.11	1,185.92	1,304.51	1,434.96	1,578.46	1,736.31	1,909.94	
1,357.62	1,493.38	1,642.72	1,806.99	1,987.69	2,186.46	2,405.11	
1,520,530.47	1,672,583.52	1,839,841.87	2,023,826.05	2,226,208.66	2,448,829.52	2,693,712.48	
1,683,636.05	1,850,306.14	2,033,643.23	2,235,314.04	2,457,151.93	2,701,173.61	2,969,597.45	

FINANCIAL PROJECTIONS

Capital Investment/Fixed Costs						
Items	Units	Qty	Unit price	Year 0	Year 1	Year 2
Breeding stock:sows	pigs	120	1,500.00	180,000.00	79200	87120
Breeding stock:boars	pigs	5	2,200.00	11,000.00	4840	5324
Insurance	%	2.50%		2,047.48	2,047.48	2,047.48
Pig attendants (permanent)	month	3	500.00	9,000.00	19,800.00	21,780.00
Manager's salary	month	1	1,200.00	7,200.00	15,840.00	17,424.00
Transportation cost (Materials)		1	3,500.00	3,500.00	0	0
Electricity (Installation)		1	7,000.00	7,000.00	0	0
Electricity bill/month	months	12	85.00	510.00	1122	1234.2
Depreciation Cost						
Feeding scoops	scoop	2	30.00	60.00	12.00	12.00
Wheel barrow	barrow	2	500.00	1,000.00	200.00	200.00
Spade	spade	2	55.00	110.00	22.00	22.00
30m Hosepipe	Hosepipe	1	310.00	310.00	62.00	62.00
Tooth cutting pliers	Cutter	1	12.00	12.00	2.40	2.40
Perimeter Fence	metre	280	15.00	4,200.00	280.00	280.00
Storeroom	room	12	625.00	7,500.00	375.00	375.00
Manager's house	house	32	625.00	20,000.00	1,000.00	1,000.00
Farrowing house	house	168	176.28	29,615.04	1,480.75	1,480.75
Sow Pens	pens	288	21.50	6,192.00	309.60	309.60
Growing house	house	432	176.28	76,152.96	3,807.65	3,807.65
Growing Pens	pens	264	21.50	5,676.00	283.80	283.80
Boar pens	pens	12	21.50	258.00	12.90	12.90
Toilet	toilet	5	625.00	3,125.00	156.25	156.25
Vehicle	van	1	65,000.00	65,000.00	4,333.33	4,333.33
Weighing scale	scale	1	500.00	500.00	50.00	50.00
Feeding troughs	troughs	20	900.00	18,000.00	1,800.00	1,800.00
10000 Litre tank	Jojo	1	7,000.00	7,000.00	700.00	700.00
Total depreciation					14,887.68	14,887.68
Total Investment				464,968.48		
Fixed costs				220,257.48	137,737.16	149,817.36
Operational/Variable costs						
Transportation costs	month	12.00	550.00	6,600.00	7,260.00	7,986.00
500ml sulphazine	millilitres	1.00	57.95	57.95	63.75	70.12
Dry sow & boar meal	50 kg		140.00	81312	193793.6	196775
Dry sow & boar meal	50 kg		140.00	10220	11242	12366
Lactating meal	50 kg		142.00	66797	318398	323297
Creep meal	50 kg		180.00	5746	27387	27809
Weaner meal	50 kg		150.00	0	228228	231739
Grower meal	50 kg		148.00	0	385846	509316
Finisher meal	50 kg		130.00	0	39560	52219
Dry sow & boar meal	50 kg		140.00	6048	6653	7318
1 * 20L Disinfectants	litres	1.00	325.00	325.00	358	393.25
1 * 5L pig pours	litres	1.00	550.00	550.00	605	665.50
Water charge:20L/day/pig	litres	2,000	3.33	6,660.00	7,326	8,058.60
Scrubbing /cleaning brooms	broom	2.00	42.00	84.00	92	101.64
Sweeping brooms	broom	2.00	35.00	70.00	77	84.70
Pairs of overalls	Overalls	6.00	150.00	900.00	990	1,089.00
Pairs of gumboots	boots	6.00	110.00	660.00	726	798.60
Pair of dust coats	coats	6.00	135.00	810.00	891	980.10
Electricity bill/month	month	12.00	85.00	1,020.00	1,122	1,234.20
Totals				187,859.35	1,230,617.77	1,382,300.43
Total Costs				652,827.83	1,368,354.93	1,532,117.79

- Control of diseases and parasites to help reduce mortality rate
- Efficient allocation and utilization of inputs
- Controlling costs
- Keeping highly productive sow breeds with good maternal and paternal attributes and is capable of producing 16 piglets twice a year and;
- Maintaining use of proper feeds for fast growth and weight gain

It should be noted that properly managed pig projects will enable sows to produce the highest number of pigs that can be sold in the shortest possible time. If pigs are poorly managed, they become very wasteful. Under good management practices improvements in the table below will be observed:

Years	0 to 3	4 to 6	7 to 10
Farrowing Rate	80%	85%	95%
Mortality Rate: Piglets	5%	3%	2%
Mortality Rate: Adults	5%	3%	2%
Replacement of breeding stock that died during the year	5%	3%	2%

Health and Common diseases

The table lists common diseases, their prevention and treatment.

Disease/condition	Causes	Control/prevention	Treatment
Africa Swine fever	Virus	<ul style="list-style-type: none"> No vaccine Keep good hygiene Avoid contact between pigs, wild pigs/ warthogs. All garbage feeds should be cooked 	No treatment to date
Anaemia	Deficiency in iron	<ul style="list-style-type: none"> Administer injectable iron to the piglets after birth. Make sure feeds are rich in iron 	Administer injectable iron
Mastitis	Bacteria (<i>eryscheuchia coli</i>)	<ul style="list-style-type: none"> Practice good hygiene Use soft bedding other than saw dust 	Tetracycline, sulphonamide
Agalactia (failure to produce milk)	Deprivation from water	<ul style="list-style-type: none"> Provide clean water Clean and disinfect pens 	Injection of oxytocin
Erysipelas	Bacteria (<i>bacteria erysipelothrix</i>)	<ul style="list-style-type: none"> Clean and disinfect pens Inject with long acting penicillin 	Injection of penicillin
Tuberculosis	Bacteria (<i>mycobacteriosis</i>)	<ul style="list-style-type: none"> Isolate the infected Good management Provide best environment Supplement with appropriate feed 	Use of antibiotics

Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
240	240	240	240	240	240
5	5	5	5	5	5
240	240	240	240	240	240
2280	2280	2280	2280	2280	2280
2280	2280	2280	2280	2280	2280
2257.2	2257.2	2257.2	2257.2	2257.2	2257.2
228	228	228	228	228	228
120	120	120	120	120	120
7650	7650	7650	7650	7650	7650
1761	1761	1761	1761	1761	1761.3
100%	100%	100%	100%	100%	100%

Loan

Institution	CEDA
Interest rate/yr %	7.50%
Repayment period	10
Amount (Yr 0 total costs)	652,827.83
Taxation	15.00%
Loan repayment (0 year)	\$ 10,567.54

Depreciation

	Years
Houses	20
Pig structures	20
Fencing	15
Vehicle	15
Feed troughs	10
Weighing Scale	10
Tools	5

Replacement rate of breeding stock, every	3 years
Replacement (%): Sows/Boars	40%
No. of boar replaced/year	2
No. of sows	48
Less: Total Replacement gilts per yr %	50
Production Cycle:	4
Mortality of Initial stock	% 0.1

SUMMARY OF KEY ASSUMPTIONS OF PRODUCTION (CONTINUED)

Herd Inventory				
	Year 0	Year 1	Year 2	Year 3
sows	120	260	240	240
boars	5	5	5	5
Farrowed Sows	60	260	240	240
Piglets	570	2470	2280	2280
Weaners	0	2470	2280	2280
Growers	0	1881	2257.2	2257.2
Finishers	0	190	228	228
serviced sows	120	120	120	120
Total	875	7656	7650	7650
Off take				
Offtake (Baconers & Porkers)	0	1087	1761	1761
% Rate of Offtake	0.00	0.62	100%	100%

Production Parameters

Breeding stock	125
Boar % of breeding stock	4%
Sow % of breeding stock	96%
No. of sows	120
No. of boars	5
Litter Index per year	2
Piglets littered per sow	10
Batch size (sows)	20
Number of batches	6
Piglet mortality rate	10%
Suckling period (weeks)	3
Weaner age (weeks)	8
Porker age (months)	5
Baconer age (months)	6
Porkers for sale	99%
Baconers for sale	1%
Porker weight (kg)	60
Baconer weight (kg)	110
Total piglets per yr	2160

Market price

Price Inflation 10% per year	1.1
Insurance % per year	3%
Baconers per kg	15
Porkers per kg	15
Sows (culling)	1,250
Boars (culling)	1,850

These diseases are costly as they can erode pig performance and contribute to high pig mortality. Therefore, the farmer should be able to identify diseases symptoms and apply preventative measures on time.

Common parasites

Parasite	Internal/external	treatment
Large roundworm	Internal	piperazine
Nodular worm	internal	Invermectin, piperazine
lice	external	Dazzle dip

Production process

Production process involves the following processes;

- Mating/Serviceing
- Gestation
- Farrowing
- Weaning
- Culling and replacement and;
- Marketing

The steps the farmer should adhere to when planning to stock a start-up project follows;

- Buy gilts at the age of 6 – 7 months and put them in the paddocks where mating will take place.
- The gilts should be weighing, on average, 125kgs at seven and a half to eight months when they are ready to be mated
- Keep gilts where they will hear, smell and have contact with a mature boar
- Provide adequate space to allow maximum exercise
- Flush gilts for 10 – 14 days and increase nutritious feed intake to;

- a) Stimulate them to come into heat within seven (7) days and conceive as soon as possible
- b) Ensure they are in good active conditions and weighing, on average, 125kgs
- The heat lasts for 21 days within which gilts can be served with a boar. The mating ratio is 1 boar to 25 sows.
- After mating the gestation period will take approximately 114 days (**three months, three weeks and three days**)
- The farrowing pens should be cleaned thoroughly, disinfected and left unused for 5 – 7 days.
- When the gilts are ready for delivery, put them into a well prepared farrowing house where the temperatures are 18 – 21°C.
- During delivery, which takes 30 minutes to 5 hours, the farmer should be present to:
 - a) stimulate weak piglets
 - b) Clip the 8 sharp needle teeth to reduce injury to the sows' teats and litter mates from fighting.
- A sow will be in the lactation period for 8 weeks (2 months) after which it should be weaned from its litters to allow them to dry off for 4 – 7 days
- Give iron injection in the neck muscle (1ml) and remove tail from 3 days to 3 weeks
- During weaning processes, weaners should be kept in the growing pens where the temperatures are warm (28 - 32°C). Warm temperatures will help weaners grow and gain weight faster
- During this process, culling should be done if;
 - a) The sow is continuously failing to conceive
 - b) There is continuous poor litter size, for example, less than 8 piglets
 - c) There is any serious physical problems that may be difficult to correct

Operational Items	Qty	Cost/Yr
Electricity bill (Months)	12	85
Manager's Salary (months)	1	1200
Pig Attendants salary/month	3	500
Purchase price/sow:	1	1500
Purchase price/boar:	1	2200
Transportation costs	12	550
500ml sulphazine	1	57.95
1 * 20L Disinfectants	1	325
1 * 5L pig pours	1	550
Water charge:20L/day/pig	2000	3.33
Scrubbing /cleaning brooms	2	42
Sweeping brooms	2	35
Pairs of overalls	6	150
Pairs of gumboots	6	110
Pair of dust coats	6	135

Type of pig	Feed types	Intake kg/day	No. of days fed	Unit Price
Dry sow	Dry sow & boar meal	2	121	140
Boars	Dry sow & boar meal	2	365	140
Farrowed Sows	Lactating meal	7	56	142
Piglets	Creep meal	0.08	35	180
Weaners	Weaner meal	0.8	35	150
Growers	Grower meal	1.5	42	148
Finishers	Finisher meal	2.6	28	130
Dry sow (lost days)	Dry sow & boar meal	2	9	140

SUMMARY OF KEY ASSUMPTIONS OF PRODUCTION

Dimensions & quantity for structures

	Length	Width	Qty	Perimeter	Area
Pig farm	70	70	1	280	
Farrowing house	12	9	4	168	432
Sow Pens & size	2	3	48	480	288
Boar pen house	2	1.5	4	28	12
Growing house	12	9	4	168	432
Growing pens	4	3	22	308	264
Storeroom	4	3	1	14	12
Manager's house	8	4	1	24	32
Toilet/Pit Latrine	2	2.5	1	9	5
No. of sows/pen			5		
No. of boars/pen			1		

Development Costs/m2

	Qty	Unit price
Fencing/m		15.00
Manager and Toilet/m ² houses		625.00
Pens/m ²		21.50
Farrowing house		176.28
Growing house		176.28

Operational Costs

	Qty	Unit price
Electricity (Installation)	1	7,000.00
Transportation (Materials)	1	3,500.00
Feeding scoops	2	30.00
Wheel barrow	2	500.00
Spade	2	55.00
30m Hosepipe	1	310.00
Tooth cutting pliers	1	12.00
Breeding stock: Sows		1,500.00
Boars		2,200.00
Vehicle	1	65,000.00
Weighing scale	1	500.00
Feeding troughs	20	900.00
10000L Tank	1	7,000.00

- Immediate replacement of culled pigs (especially breeding stock) will be done as soon as it happens. However, normal replacement is after every 3 years or at least six (6) litters.
- The first batch of pigs from the initial breeding stock will be ready for slaughtering and sale as porkers and baconers, on the **10th or 11th** month after their arrival.
- Porkers which are lighter in weight than baconers should be slaughtered when they reach market weight of 45-70kg at the age of 4 - 5 months.
- Baconers should be slaughtered at the age of 6 - 7 months weighing 71 - 110kg market weight.

Records management

Good record management system plays an important role in the success and profitability of any business endeavor. Therefore, a farmer should keep and manage records from the commencement of the business and throughout its entire life. Farm records enable the farmer to track the performance of the business and make informed decisions. As such, the following records should be adequately kept;

- Identification and selection of breeds
- Number of piglets farrowed
- All feeds purchased and fed to pigs
- Herd health (Deaths and causes)
- Conception, performance replacement and mortality rates
- Breeding, servicing, farrowing and weaning dates
- Number of culled, sales, slaughtered (for home consumption) and purchases (for replacement)
- Vaccination and other veterinary requisites and
- Input variable costs
- Water, feed and labour requirements

Marketing issues

Some pig products have a short shelf life. The farmer may produce top quality products that may perish if it is not where the consumer wants it and is not properly packaged. Appropriate grading and packaging are essential and should be done to match the desired product specifications by the consumer. For example, pork short ribs and bacon should be packaged in perforated plastic bags to enhance product value and consumption rate.

In addition, slaughtering and sales of porkers and baconers could be on the **10th or 11th month** after the initial stock has arrived in the farm. For example, porkers which are lighter in weight than baconers should be slaughtered when they reach market weight (45-70kg) at the age of 4 and 5 months. Baconers should be slaughtered at the age of 6 - 7 months when they reach market weight of 71 to 110kg.

FIXED ASSETS

Key fixed assets required in pig production are prescribed in the attached **Appendix 1**. Some fixed assets in the attached Appendix may not be necessary for farmers operating either small or medium scale projects. Instead, they can be hired from other farmers at a cheaper price. For example, if it is convenient and cheaper for the farmer to keep some items at home and commute everyday between home and the project site, then it is advisable not to construct a residential house and storeroom at the production site.

Structures

Materials and equipment required for the construction of structures and buildings (farrowing and growing houses, boar and pregnant sow pens) can be sourced from hard-wares and

		Herd Inventory				
YEAR	Piglets	Weaners	Growers	Finishers	Ssows	Fsows
10			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	

HERD INVENTORY (CONTINUED)

YEAR	Piglets	Weaners	Growers	Finishers	Ssows	Fsows
7			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	
8			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	
9			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	

stores specializing in selling agricultural products/inputs. Farmers should note that prices for items required vary greatly depending on where and when they are purchased. In this guideline, the average building cost is based on per m². Structures like gilt and sow pens should be built adjacent to the boar pens as this will enable the farmer to check daily when sows and gilts could be introduced to boars.

Recommended requirements for structures

Structure	Dimensions	Qty	Description and use of the structure
Pig shed house	12m * 9m	1	<ul style="list-style-type: none"> It is recommended that the house be built using cement and concrete for strength Windows on both sides are required to allow ventilation
Growing house	4m x 3m/weaner	6	<ul style="list-style-type: none"> Accommodates 20 pens Water troughs required here A pen should have a 1 meter high concrete wall on each side.
Dry sow pen	2.5m x 2.5m	20	<ul style="list-style-type: none"> Accommodates a sow and its piglets Be built such that the sow will not be able to turn around but will provide physical comfort for sow and piglets
Gilts pen	25m ² =5gilts	24	
Boar pen	3m ² = 1 boar	5	<ul style="list-style-type: none"> A boar/3m² pen is recommended Should have walls and gates measuring 1.4 meters high A rough floor constructed using cement and concrete required to prevent pigs slipping off and breaking their legs. Floor should slope to allow easy flow of effluence into a manure channel.
Pregnant sow pens	2.5m x 2.5m	20	<ul style="list-style-type: none"> Accommodates pregnant sows Should be built such that it will provide physical comfort for a sow during delivery
Sewerage/ drainage area	No size limitations	1	<ul style="list-style-type: none"> Dig a pit and use cement and concrete for building the wall and floor. Used for easy flow of effluence (urine and dung).
Farrowing pens	2m x 2.5m	16	<ul style="list-style-type: none"> Consists of farrowing pens

YEAR	Piglets	Weaners	Growers	Finishers	Ssows	Fsows
4			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	
5			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	
6			376.2	38		
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	

HERD INVENTORY

YEAR	Piglets	Weaners	Growers	Finishers	Ssows	Fsows
0					120	
	570					60
1	570					60
		1140				
			1128.6	114		
					120	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	
	2			376.2	38	
380						40
		950				
			1128.6	114		
					100	
1140						120
		1140				
			752.4	76		
					120	
760						80
		190				
3				376.2	38	
	380					40
		950				
			1128.6	114		
					100	
	1140					120
		1140				
			752.4	76		
					120	
	760					80
		190				
					20	

Recommended floor space requirements/weight of a pig

It is generally difficult to provide the optimal area per pig at all stages of the life cycle because pigs are continuously increasing in size. Optimal floor space should be provided for a pig as that is essential for its comfort, growth, health, productivity and general wellness.

Weight of a pig	Minimum floor space
23 kg (50lbs)	0.6m (2ft ²)
45kg (100lbs)	1.4m (4ft ²)
68kg (150lbs)	1.9m (6ft ²)
91kg (200lbs)	2.5m (8ft ²)
102kg (225lbs)	2.8m (9ft ²)

INPUT REQUIREMENTS

Recommended temperature requirements

Type of structure	Category	Temps (Degrees Celsius)	Advantages of Cold & warm temps	Disadvantages of Cold & warm temps
Farrowing/ Grower/ Finishing pens	Sows and weaners	18 – 21	Cool temps <ul style="list-style-type: none"> • Help sows produce enough milk for piglets • Increase pig performance resulting in increase in feed intake and improve conception rate 	Warm temps; <ul style="list-style-type: none"> • Reduces pig performance resulting in reduction in feed intake and conception problems that lead to low production
Farrowing crate	Piglets	28 – 32	Warm temps; <ul style="list-style-type: none"> • Keep piglets growing healthy 	Cool temps; <ul style="list-style-type: none"> • Chilling conditions will result in piglets dying

YEAR	J	F	M	A	M	J	J	A	S	O	N	D
10	s\$5	s\$6										
	fd/5	fd/6										
	w/2	w/3	w/4	w/5	w/6							
			s/1	s/2	s/3	s/4	s/5	s/6				
	sd=2	sd=3	sd=4	sd=5	sd=6							
			fd=1	fd=2	fd=3	fd=4	fd=5	fd=6				
						w=1	w=2	w=3	w=4	w=5	w=6	
									s=1	s=2	s=3	s=4
						sd"1	sd"2	sd"3	sd"4	sd"5	sd"6	
									fd"1	fd"2	fd"3	fd"4
											w"1	
											sd-1	

keys

sd= serviced
 fd= farrowed
 w= weaned
 s= sales

Average number of piglets is 2280 per year beginning from year three when a plateau has been reached.

The objects such as *,/,,\$ e.t.c are used to distinguish a full cycle of batches (one to six) from time of being serviced to the time when sales are made for those batches. A batch comprise 20 sows and a whole cycle has six batches

PRODUCTION PLAN GUIDE (CONTINUED)

YEAR	J	F	M	A	M	J	J	A	S	O	N	D
7	s\5	s\6										
	fd~5	fd~6										
	w~2	w~3	w~4	w~5	w~6							
			s~1	s~2	s~3	s~4	s~5	s~6				
	sd(2)	sd(3)	sd(4)	sd(5)	sd(6)							
			fd(1)	fd(2)	fd(3)	fd(4)	fd(5)	fd(6)				
						w(1)	w(2)	w(3)	w(4)	w(5)	w(6)	
									s(1)	s(2)	s(3)	s(4)
						sd\1	sd\2	sd\3	sd\4	sd\5	sd\6	
									fd\1	fd\2	fd\3	fd\4
												w\1
8	s(5)	s(6)										
	fd\5	fd\6										
	w\2	w\3	w\4	w\5	w\6							
			s\1	s\2	s\3	s\4	s\5	s\6				
	sd;2	sd;3	sd;4	sd;5	sd;6							
			fd;1	fd;2	fd;3	fd;4	fd;5	fd;6				
						w;1	w;2	w;3	w;4	w;5	w;6	
									s;1	s;2	s;3	s;4
						sd+1	sd+2	sd+3	sd+4	sd+5	sd+6	
									fd+1	fd+2	fd+3	fd+4
												w+1
9	s;5	s;6										
	fd+5	fd+6										
	w+2	w+3	w+4	w+5	w+6							
			s+1	s+2	s+3	s+4	s+5	s+6				
	sd\$2	sd\$3	sd\$4	sd\$5	sd\$6							
			fd\$1	fd\$2	fd\$3	fd\$4	fd\$5	fd\$6				
						w\$1	w\$2	w\$3	w\$4	w\$5	w\$6	
									s\$1	s\$2	s\$3	s\$4
						sd/1	sd/2	sd/3	sd/4	sd/5	sd/6	
									fd/1	fd/2	fd/3	fd/4
												w/1

Requirements for preventing piglets from cold conditions

- Construct a creep area where piglets can lie for safety. The warmth creep area provides will help reduce deaths as a result of crushing/overlay.

Requirements for preventing pigs from hot weather conditions

- Relieve can be gained by hosing the pigs down
- Use wallows located under shade a long time for wet - skin cooling in pigs. Note that wallows located under shade are more effective than unshaded wallows.
- Use of heating systems like brooder or mbaola may be used to provide additional heat in the creep area. These heating systems should be kept a distance away from the sows to avoid possible injuries.

Feed requirements

According to Pig section, Department of Animal Production, nutrients requirement of the pig changes at every stage of pig's life cycle. However, pig feeding program most widely practiced in Botswana is comprised of dry sow meal, lactating sow meal, creep meal, weaner meal, grower meal, boar meal and finisher meal. Feeds accounts for 70% of producing pig meat (pork and bacon) and this requires for use of high quality feeds for production of specific products. Good quality feeds helps to;

- Increase the performance of pigs
- Optimize feed efficiency and
- Generate enough income

Feed intake program

The table below shows average feed intake per day

Type of feed	Pig Categories	Body mass (kg)	Intake/day (kg)	Duration of feeding (weeks)
Dry sow meal	Dry sows	Adult	2	41
Lactating sow meal	Lactating sows	Adult	1) = 2 - 2.5 2) = 7	1 8
Creep meal	Piglet	10-23kg	0.008	8
Weaner meal (18% crude protein)	Weaners	18-25kg	0.8	5
Grower meal (16% crude protein)	Growers	57-70kg	1.5	6
Finisher meal (14% crude protein)	Finishers	71-110kg	2.6	4
Boar meal	Boars	Adult	2	12

Water requirements

Water is an important ingredient for the maintenance of pig's body temperatures. Limited water intake will very quickly lead to a rise in body temperature, deaths and reduced rate of feed intake, low milk production and reduced efficiency in regular body gain. The table below shows average water intake per day;

YEAR	J	F	M	A	M	J	J	A	S	O	N	D
4	s%5	s%6										
	fd?5	fd?6										
	w?2	w?3	w?4	w?5	w?6							
			s?1	s?2	s?3	s?4	s?5	s?6				
	sd>2	sd>3	sd>4	sd>5	sd>6							
			fd>1	fd>2	fd>3	fd>4	fd>5	fd>6				
						w>1	w>2	w>3	w>4	w>5	w>6	
									s>1	s>2	s>3	s>4
						sd&1	sd&2	sd&3	sd&4	sd&5	sd&6	
									fd&1	fd&2	fd&3	fd&4
												w&1
5	s>5	s>6										
	fd&5	fd&6										
	w&2	w&3	w&4	w&5	w&6							
			s&1	s&2	s&3	s&4	s&5	s&6				
	sd<2	sd<3	sd<4	sd<5	sd<6							
			fd<1	fd<2	fd<3	fd<4	fd<5	fd<6				
						w<1	w<2	w<3	w<4	w<5	w<6	
									s<1	s<2	s<3	s<4
						sd#1	sd#2	sd#3	sd#4	sd#5	sd#6	
									fd#1	fd#2	fd#3	fd#4
												w#1
6	s<5	s<6										
	fd#5	fd#6										
	w#2	w#3	w#4	w#5	w#6							
			s#1	s#2	s#3	s#4	s#5	s#6				
	sd!2	sd!3	sd!4	sd!5	sd!6							
			fd!1	fd!2	fd!3	fd!4	fd!5					
						w!1	w!2	w!3	w!4	w!5	w!6	
									s!1	s!2	s!3	s!4
						sd~1	sd~2	sd~3	sd~4	sd~5	sd~6	
									fd~1	fd~2	fd~3	fd~4
												w~1

PRODUCTION PLAN GUIDE

YEAR	J	F	M	A	M	J	J	A	S	O	N	D
0							sd1	sd2	sd3	sd4	sd5	sd6
										fd1	fd2	fd3
1	fd4	fd5	fd6									
	w1	w2	w3	w4	w5	w6						
				s1	s2	s3	s4	s5	s6			
	sd_1	sd_2	sd_3	sd_4	sd_5	sd_6						
			fd_1	fd_2	fd_3	fd_4	fd_5	fd_6				
						w_1	w_2	w_3	w_4	w_5	w_6	
									s_1	s_2	s_3	s_4
						sd\$1	sd\$2	sd\$3	sd\$4	sd\$5	sd\$6	
									fd\$1	fd\$2	fd\$3	fd\$4
2												w\$1
												sd*1
	s_5	s_6										
	fd\$5	fd\$6										
	w\$2	w\$3	w\$4	w\$5	w\$6							
			s\$1	s\$2	s\$3	s\$4	s\$5	s\$6				
	sd*2	sd*3	sd*4	sd*5	sd*6							
			fd*1	fd*2	fd*3	fd*4	fd*5	fd*6				
						w*1	w*2	w*3	w*4	w*5	w*6	
3									s*1	s*2	s*3	s*4
						sd^1	sd^2	sd^3	sd^4	sd^5	sd^6	
									fd^1	fd^2	fd^3	fd^4
												w^1
												sd%1
	s*5	s*6										
	fd^5	fd^6										
	w^2	w^3	w^4	w^5	w^6							
		s^1	s^2	s^3	s^4	s^5	s^6					
sd%2	sd%3	sd%4	sd%5	sd%6								
		fd%1	fd%2	fd%3	fd%4	fd%5	fd%6					
					w%1	w%2	w%3	w%4	w%5	w%6		
								s%1	s%2	s%3	s%4	
					sd?1	sd?2	sd?3	sd?4	sd?5	sd?6		
								fd?1	fd?2	fd?3	fd?4	
											w?1	
											sd>1	

Water intake program

Pig Categories	Body mass (kg)	Intake/day (L)	Duration of feeding (weeks)
Dry sows	Adult	12	12
Lactating sows	Adult	20	8
Piglet	10-23kg	2	8
Weaners	18-25kg	4	5
Growers	57-70kg	8	6
Finishers	71-110kg	12	4
Boars	Adult	12	12

INFRASTRUCTURE

Infrastructure resources required for pig production include market availability, telephones, roads and electricity.

Market availability:

The farmer should have access to reliable markets where s/he can sell her/his products.

Telephones

These are vital means of communication especially for marketing the product. It will enable the farmer to confirm with the buyer, the price, the quantity ordered and where and when it should be delivered.

Roads

It is advisable to locate the project nearer to good roads as that will help minimize costs and enable the farmer have access to and from the project.

Electricity

Electricity is essential for the growth and sustainability of the business. Therefore, locating the project where there is availability of electricity would enable the farmer to expand the business and buy some equipment that can be operated using electricity.

Variable inputs

Variable inputs required include feeds, medication (e.g. sulphazine), protective clothing, casual labour, water, disinfectant, transportation and gas. These variable inputs, except labour, can be sourced from the Ministry of Agriculture, hard-wares and stores specializing in selling agricultural products/inputs.

Capital Required

Starting a business requires capital injection either from the owners or financial institutions. This guideline is based on assumption that the project will be a start up with exception of land which the owner will contribute whilst capital expenditure and working capital will get financing from CEDA at the interest 7.5% annually. The repayment period will be 10 years with one annual payment. (See Appendix 1 attached for details of items to be purchased).

The financial projections of the piggery enterprise comprise key assumptions, project analysis (fixed assets, profit and loss, summary of cash flows and break even) and loan amortization.

All of these parameters measure the profitability and viability of the enterprise. Calculations done indicate that this enterprise starts to be profitable from second year of operations and is able to met all its obligations.

Sale of pig products starts second year because the project is assumed to have commenced midyear of the first year. Cash flow is positive and indicates that the funds needed for startup will be only for capital expenditure and first year expenses which will amount to P652, 827.83.

The financial analysis of this project was based on the assumption that 125 pigs (120 sows and 5 boars) will be the size of the operation. The total number that will be produced for slaughter (beacon and porkers combined) was estimated to be 2071 in the first year and the number becomes consistent at 2487 pigs slaughter annually for subsequent years. The financial projections indicate that the project breaks-even at an average price of P989.68 and average number of 354 piglets raised for slaughter. For detailed analysis of breakeven see appendix 1.