

# **PROFITABILITY OF DEEP BED FARMING (2019 FOCUS GROUP SURVEY)**

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## **Introduction**

Farming is the main enterprise for almost all smallholder farmers and therefore it needs to be profitable for it to be sustained. In Malawi, however, smallholder farmers are moving out of farming for paid labor even at minimal wages. This implies that with current practice farming is becoming unsustainable. Deep Bed Farming is a new technology being promoted as a sustainable farming method. Its main benefits include conserving soil and water, sustaining soil productivity, and eradicating hunger and income poverty. However, the DBF method can only be used as a sustainable method of farming if it is profitable and so that farmers can sustain it on farm.

**Objective:** To analyze the profitability of DBF as compared to the conventional ridge method

## **Methodology:**

### **Study Design:**

We employed the Profit-Loss Account (Gross Margin Analysis) and the Benefit-Cost Ratio to assess profitability. Data was collected using Focus Group Discussions from all areas where Tiyeni was conducting its activities. The data that was gathered included type of inputs required, amount required per ha, expected yields and the prices of the costs and yields for both the conventional ridge and the DBF.

## **Area and Sample**

The study targeted farmers in Northern and Central Regions of Malawi where Tiyeni has been conducting its activities. It was done in Dowa District in the Central Region, Mzimba South, Mzimba North and Nkhata Bay Districts in the Northern Region. A total of 14 group discussions targeting between 10 and 30 farmers were carried out meeting with a total of 346 farmers. The farmers that were targeted for the group discussion were those that at least had a harvest from DBF farming. Seven group discussions were conducted in Central Region, Dowa district in Madisi EPA: and another 7 group discussions were conducted in Northern Malawi, 5 groups in Mzimba North District (2 groups in Bwengu EPA, 2 groups in Emsizini EPA and one in Zombwe EPA), one in Chikangawa EPA in Mzimba South District and one group in Chikwina EPA in Nkhata Bay District.

## **Study Models**

The study employed methods which are more applicable to smallholder farming. The prices were estimated using current market prices instead of the net present value. Also the net present value of fixed assets was not calculated because they tend to move both towards depreciation as well as appreciation hence difficult to calculate. Also the costs of implements and housing were not accounted for since their value could not be divided between enterprises. Therefore the simple profit and loss (P&L) statement which looks like the Gross Margin was used.

The profit and loss (P&L) statement is a financial statement that summarizes the revenues, costs, and expenses incurred during a specified period, in this case a year. Since not all overhead costs in

smallholder farming can be estimated the results could be defined as a Gross Margin. A Gross margin is a net sale's revenue from an enterprise minus its cost of production. In other words, it is the sales revenue retained after incurring the direct costs associated with producing the goods.

## Results and Discussions

The study involved 14 groups of farmers. On average there were about 25 farmers per group and there was a total of 346 individual farmers who participated. Table 1 below shows these groups representing the Central (7 groups) and Northern Regions of Malawi (7 groups).

**Table 1: Number of Farmers per Focus Group Discussion**

Region	No.	District	EPA	Section	Group of Farmers in the Discussion
Central Region	1	Dowa	Madisi	Kachala	29
	2	Dowa	Madisi	Mphamba	26
	3	Dowa	Madisi	Mphamba	11
	4	Dowa	Madisi	Chigoma B	12
	5	Dowa	Madisi	Kabanga B	16
	6	Dowa	Madisi	Kabanga A	28
	7	Dowa	Madisi	Madisi B	40
Northern Region	8	Mzimba North	Bwengu	Emoyeni	32
	9	Mzimba North	Bwengu	Enukweni 2	20
	10	Mzimba North	Emsizini	Kafulufulu	11
	11	Mzimba North	Emsizini	Chimbongondo	27
	12	Mzimba South	Chikangawa	Katowo	31
	13	Mzimba North	Zombwe	Kadambo (Ngulube)	31
	14	Nkhata Bay	Chikwina	Chikwina	32
	<b>Total No. of Farmers</b>				<b>346</b>
	<b>Average Group Size</b>				<b>25</b>

### The History of Each Group in DBF farming.

This table summarizes the progress of DBF farming in the various sites trying to show the number of farmers that practiced DBF each year starting from the year 2016 up to 2019. Most of the groups started using DBF in 2017 and by 2019 they had used DBF for three years. This table shows that some farmers in these discussions were well knowledgeable having used DBF for about three years. The progresses in the number of farmers by years show that there is a steady increase of farmers practicing DBF in each site.

**Table 2: The Number of Farmers that Practiced DBF in that Given Year**

Region	No.	District	EPA	Section	Number Of Farmers In The Group In The Specific Year			
					2016	2017	2018	2019
Central Region	1	Dowa	Madisi	Kachala			3	38
	2	Dowa	Madisi	Mphamba	10	26	36	56
	3	Dowa	Madisi	Mphamba	3	6	14	24
	4	Dowa	Madisi	Chigoma B		5	36	77
	5	Dowa	Madisi	Kabanga B		7	75	95
	6	Dowa	Madisi	Kabanga A	5	25	47	78
	7	Dowa	Madisi	Madisi B				
Northern Region	8	Mzimba North	Bwengu	Emoyeni				20
	9	Mzimba North	Bwengu	Enukweni 2			20	84
	10	Mzimba North	Emsizini	Kafulufulu		6	24	56
	11	Mzimba North	Emsizini	Chibongondo		8	14	90
	12	Mzimba South	Chikangawa	Katowo			38	51
	13	Mzimba North	Zombwe	Kadambo (Ngulube)		13	28	30
	14	Nkhata Bay	Chikwina	Chikwina	12	14	23	10
	<b>Total</b>				<b>30</b>	<b>102</b>	<b>344</b>	<b>619</b>

### Land Size under DBF

The farmers were asked how much total land holdings they own and on average their land holdings were about 1.8ha per household. When asked how much land they started with to cultivate using DBF in the first year, on average they said that they started DBF with a land size of 0.04ha representing 2% of total land area. In the second year they had a DBF land size of about 0.19ha representing 11% of total land area and in the third year, they increased the land size of DBF to 0.35ha representing 20% of total land area.

**Table 3: Land Size That farmer put to DBF in Subsequent Years**

Region	No	District	EPA	Section	Land Size			
					Total HH Land	DBF Land 2017	DBF Land 2018	DBF Land 2019
Central Region	1	Dowa	Madisi	Kachala	3		0.4	0.7
	2	Dowa	Madisi	Mphamba	2	0.01	0.2	0.4
	3	Dowa	Madisi	Mphamba	1	0.1	0.2	0.3
	4	Dowa	Madisi	Chigoma	1.5	0.03	0.2	0.3

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	5	Dowa	Madisi	Kabanga B	2.6	0.02	0.1	0.2
	6	Dowa	Madisi	Kabanga A	1.2	0.01	0.5	0.5
	7	Dowa	Madisi	Madisi B	1.2		0.1	0.2
Northern Region	8	Mzimba North	Bwengu	Emoyeni	2.5			0.10
	9	Mzimba North	Bwengu	Enukweni 2	1.5		0.10	0.20
	10	Mzimba North	Emsizini	Kafulufulu	1		0.20	0.40
	11	Mzimba North	Emsizini	Chimbonondo	1.97	0.03	0.17	0.36
	12	Mzimba South	Chikangawa	Katowo	2		0.04	1.00
	13	Mzimba North	Zombwe	Kadambo (Ngulube)	1.5	0.01	0.10	0.15
	14	Nkhata Bay	Chikwina	Chikwina	2.1	0.10	0.15	0.15
<b>Average Land Size</b>					<b>1.8</b>	<b>0.04</b>	<b>0.19</b>	<b>0.35</b>
<b>Percentage of Total Land Size</b>					<b>100%</b>	<b>2%</b>	<b>11%</b>	<b>20%</b>

### Profit and Loss Statement

The farmers were led into calculation of costs and incomes from the two farming DBF and Conventional Ridge. They were led to follow an outline of activities from land acquisition (rent), land preparation, use of inputs and all the other activities up to harvesting. They were also led to estimate the harvest from each farming method and its total cash value.

The farmers' consensually estimated yields of maize were 4.2MT on Conventional Ridge and 7.8MT in DBF. In almost all groups farmers said that yield of maize from DBF was double that of Conventional Ridge. When costs were estimated, it was found out that the Conventional Ridge costed farmers MK617,008.94 annually to produce maize per hectare while DBF costed the farmers MK791,204.56 in the first year and MK593,745.71 on average for 5 years. These costs showed that DBF was a cheaper method of cultivation compared to Conventional Ridge regardless it produces double as much yield.

At the average produce price of MK155.21 the value of produce from the Conventional Ridge was MK665,966.20 and after subtracting costs the profit the farmers get from Conventional ridge is MK48,957.26 per annum. On the other hand on DBF the produce value is MK1,217,830.43 and if we subtract the cost of first year of making beds the profit MK426,625.87 about ten times that of Conventional Ridge. The profits improve to MK624,084.72 if we consider the five year average given that tilling and making beds will be done only once.

The estimates show that Conventional Ridge farming is not viable at all. There is hardly any profit that farmers get. It is distributed to monthly the farmers will have an income of MK4,000 versus MK36,000 per month if the farm starts DBF in that same year or MK52,000 if the cost have been distributed to a 5 year period.

**Table 4: Profit and Loss Statement**

REVENUE	AMOUNT IN MALAWI KWACHA ((MK)			
	CONVENTIONAL RIDGE	1ST YEAR DBF	Frequency in 5yrs	5 YEARS OF AVERAGE DBF
Yield in (kg)	4290.74	7,846.34	5	7,846.34
Price (MK)	155.21	155.21	5	155.21
<b>Total Revenue</b>	<b>665,966.20</b>	<b>1,217,830.43</b>	<b>5</b>	<b>1,217,830.43</b>
<b>COSTS (MK)</b>				
Land Rent	51,164.29	51,164.29	5	51,164.29
Land Clearing	23,465.00	-	-	-
Tilling	-	136,555.71	1	27,311.14
Manure	60,338.57	92,625.00	5	92,625.00
Transport for manure	50,193.93	40,490.36	5	40,490.36
Manure application	19,054.29	25,582.14	5	25,582.14
Ridge making	47,988.57	-	5	
Bed Making	-	110,267.86	1	22,053.57
Seed	41,460.71	40,931.43	5	40,931.43
Planting Labour	19,671.79	20,642.14	5	20,642.14
Basal Fertiliser	69,301.14	38,296.76	5	38,296.76
Basal Manure	-	2,875.79	5	2,875.79
Basal Mix Application Labour	17,731.07	19,318.93	5	19,318.93
1st Weeding	32,286.43	34,844.64	5	34,844.64
Top Dressing	60,559.11	39,399.44	5	39,399.44
Top Dressing Manure	-	2,875.79	5	2,875.79
Top Dressing Mix Application Cost	17,907.50	19,318.93	5	19,318.93
2nd Weeding	35,462.14	28,846.07	5	28,846.07
Harvesting	29,640.00	29,551.79	5	29,551.79
Stooking	13,320.36	-	5	-
Mulching	3,793.21	19,475.00	5	19,475.00
Transport of harvest	23,670.83	38,142.50	5	38,142.50
<b>Grand Total Cost</b>	<b>617,008.94</b>	<b>791,204.56</b>	<b>5</b>	<b>593,745.71</b>
<b>Annual Profit (Gross Margin)</b>	<b>48,957.26</b>	<b>426,625.87</b>	<b>5</b>	<b>624,084.72</b>
<b>Monthly Profit (Gross Margin)</b>	<b>4,079.77</b>	<b>35,552.16</b>	<b>1/12</b>	<b>52,007.06</b>

## Profit and Loss Estimates in the various sites

The study found out that DBF is profitable to all the 14 groups except 1 group from Kabanga B in Madisi EPA but the Conventional Ridge farming was only profitable to 8 groups of the 14 groups. Estimates of 6 groups produced losses in conventional ridges. Both in the Northern Region and the Central Region had an equal share of losses.

If we compare the two types of profits for each site we see a striking difference between the two types of farming. At each site, when the discussions were concluded the farmers were upbeat that they will take DBF seriously. They said DBF outweighs Conventional Ridge farming by far.

**Table 5: A Summary of Profits/Losses in the various EPAs**

Region	No.	District	EPA	Section	AVERAGE ANNUAL PROFITS	
					CONVENTIONAL RIDGES	DBF
Central Region	1	Dowa	Madisi	Kachala	343,330.00	1,062,100.00
	2	Dowa	Madisi	Mphamba	184,015.00	576,498.00
	3	Dowa	Madisi	Mphamba	(72,865.00)	569,335.00
	4	Dowa	Madisi	Chigoma B	244,530.00	756,437.50
	5	Dowa	Madisi	Kabanga B	(243,295.00)	(14,079.00)
	6	Dowa	Madisi	Kabanga A	(67,925.00)	206,739.00
	7	Dowa	Madisi	Madisi B	7,410.00	784,225.00
Northern Region	8	Mzimba North	Bwengu	Emoyeni	27,911.00	1,155,960.00
	9	Mzimba North	Bwengu	Enukweni 2	217,360.00	806,949.00
	10	Mzimba North	Emsizini	Kafulufulu	249,470.00	1,225,120.00
	11	Mzimba North	Emsizini	Chibongondo	(86,450.00)	67,307.50
	12	Mzimba South	Chikangawa	Katowo	(13,832.00)	774,839.00
	13	Mzimba North	Zombwe	Kadambo (Ngulube)	(343,330.00)	539,695.00
	14	Nkhata Bay	Chikwina	Chikwina	259,967.50	283,226.67

## BENEFIT-COST RATIO

A *Benefit-Cost Ratio* (BCR) is an indicator that attempts to summarize the overall value for money of a project or enterprise. A BCR is the *ratio* of the *benefits* of a project expressed in monetary terms, relative to its *costs*, also expressed in monetary terms. If a project has a BCR greater than 1.0, the project is expected to deliver a **positive** net value to a firm and its investors. If a project's BCR is less than 1.0, the project's **costs** outweigh the **benefits**, and it should not be considered

When the Benefit-Cost Ratios were calculated for Conventional Ridge, the results show that only 6 sites out of 14 had a BCR of greater than one. The BCRs are equal to or less than one in the following sites, and it is recommended that farmers should consider to stop using Conventional Ridge in these sites: Mphamba, Kabanga A, Kabanga B, Chibongondo, Kadambo, Madisi B, Emoyeni and Katowo. Farmers do not gain any positive net value by farming using this method.

Farmers are, however, encouraged to cultivate using DBF which has a BCR of greater than one in almost all areas. The average DBF BCR ratio of 2.3 for all the sites show that there is a high and positive net value of the investment that farmers put in DBF. It is therefore highly recommended that farmers should consider using DBF for maize production in all of these sites.

**Table 6: Summary of BCRs for the Various Sites**

Region	No.	District	EPA	Section	BENEFIT-COST RATIO	
					CONVENTIONAL RIDGES	DBF
Central Region	1	Dowa	Madisi	Kachala	2.0	4.8
	2	Dowa	Madisi	Mphamba	1.4	2.3
	3	Dowa	Madisi	Mphamba	0.8	2.2
	4	Dowa	Madisi	Chigoma B	1.6	3.6
	5	Dowa	Madisi	Kabanga B	0.5	1.0
	6	Dowa	Madisi	Kabanga A	0.9	1.4
	7	Dowa	Madisi	Madisi B	1.0	2.5
Northern Region	8	Mzimba North	Bwengu	Emoyeni	1.0	2.9
	9	Mzimba North	Bwengu	Enukweni 2	1.4	2.5
	10	Mzimba North	Emsizini	Kafulufulu	1.4	3.2
	11	Mzimba North	Emsizini	Chimbongondo	0.9	1.1
	12	Mzimba South	Chikangawa	Katowo	1.0	1.9
	13	Mzimba North	Zombwe	Kadambo (Ngulube)	0.7	1.6
	14	Nkhata Bay	Chikwina	Chikwina	1.4	1.3
			<b>Over All</b>		<b>1.15</b>	<b>2.3</b>