**SUPPLEMENTARY INFORMATION**

**1- Construction of the Weighted Average Cost of Capital (WACC)**

The construction of the WACC follows the structure:

 (1)

 (2)

 (3)

 (4)

In which:

W1 = Participation of others’ capital costs;

K1 = Value of financial expenses;

W2 = Participation of the cost of equity;

K2 = Opportunity cost of equity;

Jp = Interest weighted, factor that considers both the risk sector as the producer's profile;

IPCA = official inflation index;

B = levered beta, risk indicator for an activity in relation to the systematic market risk

Rs = Risk premium associated with the sector of productive activity;

Vs = Amount invested in savings;

S = savings interest rate;

ICDB= interest rate offered by Bank Deposit Certificates;

Cp = Monetary value of equity invested in the activity;

I= Total investment.

The final capital cost was defined as a balance between the equity portion, defined here as 60%, and the amount of capital financed, 40%[[1]](#footnote-1). It was used as interest rate for the funded portion the values practiced by the Center - West Constitutional Fund, 8.75%, in 2005. This was the main and the most used financing instrument available at that time. For the equity share, the final cost was defined as: R$ 250,000.00[[2]](#footnote-2) capitalized by interest offered by Bank Deposit Certificates (CDB)[[3]](#footnote-3) deducted from income tax, and the remaining portion was capitalized with reference to the official savings rate. The outcome of adjustment in the equity cost was discounted by official inflation index (IPCA) to get the real interest rate and added a risk measure for agriculture sector, defined as the difference between the return expected value on assets of agricultural companies operating in the main capital stock of Brazil, Bovespa, and the expected return of the market portfolio with less risk.

**2- Information about representative farms case studies**

The approach used in the paper was to develop representative case studies for each of the agriculture systems evaluated based on the economic relevance of these agricultural systems for Mato Grosso (crop (soybean + corn) and livestock) and an alternative agricultural strategy (iCL) that has been encouraged by Brazilian government as a proposal for increase sustainable agricultural practices in the Amazon and Cerrado regions.

To ensure the representativeness, robustness and consistency of our data, besides the data collected in the controlled field experiment, we used regional data from Mato Grosso Institute of Agricultural Economics (IMEA), a research institution which carries out a comprehensive yearly economic survey in the main soybean, corn, cotton and beef cattle production regions in the state of Mato Grosso.

IMEA uses a worldwide consolidated methodology to elaborate regional reference farms for each commodity to provide accurate information of cost, revenue, productivity, investment and all necessary infrastructures to carry out the production activity. This approach consists of meeting with representatives from different society groups as indicated in the text. According with IMEA, to produce a final result for each region, they organize five focus group meetings, depending on region size and the economic relevance of the product. The audience size for each meeting includes roughly 80 - 100 people. The soybean meetings are bigger than others. By using regionalized data offered by IMEA to elaborate our representative farms, we ensure that our information presents the real situation observed by farmers.

To aid the accuracy in our findings, we checked all our results with farmer’s organization, consultants and trading managers and all of them were aligned with ours results. Unfortunately, we do not have access of survey instrument or other instruments used by IMEA.

**2 – Economic Results Data**

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| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Discounted Cash flows and NOPAT - Integrated Crop and Livestock system - USD/hectare** | | | | | | | | | | **Year** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | |  |  |  |  |  |  |  |  |  | | **Gross Revenue** | **0.00** | **687.19** | **1295.52** | **1798.51** | **1374.12** | **2226.97** | **2164.64** | **2734.82** | | Sales Taxes (-) | 0.00 | 33.57 | 34.02 | 39.02 | 31.84 | 30.46 | 34.43 | 29.54 | | **Net Revenue** | **0.00** | **653.62** | **1261.50** | **1759.49** | **1342.28** | **2196.51** | **2130.21** | **2705.28** | | Production Cost (-) | 0.00 | (787.93) | (921.32) | (1069.54) | (947.75) | (1392.43) | (1182.99) | (1875.71) | | **Gross Profit** | **0.00** | **(134.31)** | **340.18** | **689.95** | **394.52** | **804.07** | **947.22** | **829.57** | | Operating expense (-) | 0.00 | (21.94) | (26.81) | (31.33) | (34.76) | (36.21) | (32.45) | (44.25) | | **Operating Profit (EBIT)** | **0.00** | **(156.25)** | **313.37** | **658.62** | **359.77** | **767.86** | **914.77** | **785.32** | | Income Tax(-) | 0.00 |  | (84.09) | (178.53) | (96.40) | (207.71) | (248.56) | (210.52) | | **Net Operation Profit After Taxes** | **0.00** | **(156.25)** | **229.28** | **480.09** | **263.37** | **560.16** | **666.21** | **574.80** | | Depreciation (+) | 0.00 | 8.62 | 10.93 | 13.57 | 13.55 | 13.92 | 10.50 | 16.37 | | **Operating Cash Flow** | **0.00** | **(147.63)** | **240.21** | **493.67** | **276.92** | **574.08** | **676.71** | **591.17** | | Investment (-) | (863.38) |  |  |  |  |  |  |  | | Residual Value |  |  |  |  |  |  |  | 646.41 | | Working Capital (-) |  |  |  |  |  |  |  |  | | **Cash Flows** | **(863.38)** | **(147.63)** | **240.21** | **493.67** | **276.92** | **574.08** | **676.71** | **1237.58** | |  |  |  |  |  |  |  |  |  | | Discounting Fator | 1.00 | 1.10 | 1.20 | 1.31 | 1.44 | 1.58 | 1.73 | 1.89 | | **Discounted Cash Flow** | **(863.38)** | **(134.77)** | **200.20** | **375.60** | **192.35** | **364.03** | **391.74** | **654.04** | | Pay back |  | (998.15) | (797.95) | (422.34) | (230.00) | 134.03 | 525.77 | 1179.81 | | | | | | | | | |
| **\* 2005 values** |  |  |  |  |  |  |  |  |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Discounted Cash flows and NOPAT - Continuous Crop system - USD/hectare** | | | | | | | | |
|  | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
|  |  |  |  |  |  |  |  |  |
| **Gross Revenue** |  | **545.52** | **723.10** | **1,035.87** | **891.74** | **890.90** | **1,113.32** | **1,168.68** |
| Sales Taxes (-) |  | 30.18 | 33.63 | 36.76 | 30.78 | 28.71 | 33.66 | 35.72 |
| **Net Revenue (+)** |  | **515.34** | **689.47** | **999.11** | **860.96** | **862.18** | **1,079.66** | **1,132.96** |
| Procutction Cost (-) |  | (471.27) | (530.57) | (586.83) | (588.91) | (505.56) | (521.54) | (623.00) |
| **Gross Profit** |  | **44.07** | **158.90** | **412.28** | **272.05** | **356.62** | **558.12** | **509.96** |
| Operating expense (-) |  | (100.53) | (111.24) | (120.72) | (125.48) | (121.88) | (126.05) | (129.76) |
| **Operating Profit (EBIT)** |  | **(56.46)** | **47.67** | **291.56** | **146.58** | **234.74** | **432.06** | **380.20** |
| Income Tax(-) |  |  | (1.54) | (71.89) | (32.31) | (54.83) | (109.10) | (92.51) |
| **Net Operation Profit After Taxes** |  | **(56.46)** | **46.13** | **219.68** | **114.27** | **179.91** | **322.96** | **287.69** |
| Depreciation (+) |  | 20.74 | 23.20 | 25.54 | 25.63 | 21.75 | 17.76 | 18.07 |
| **Operating Cash Flow** |  | **(35.72)** | **69.33** | **245.21** | **139.90** | **201.66** | **340.72** | **305.76** |
| Investment (-) | (765.63) |  |  |  |  |  |  |  |
| Residual Value |  |  |  |  |  |  |  | 573.23 |
| Working Capital (-) |  |  |  |  |  |  |  |  |
| **Cash Flows** | **(765.63)** | **(35.72)** | **69.33** | **245.21** | **139.90** | **201.66** | **340.72** | **878.99** |
|  |  |  |  |  |  |  |  |  |
| Discounting Fator | 1.00 | 1.10 | 1.20 | 1.32 | 1.45 | 1.59 | 1.74 | 1.91 |
| **Discounted Cash Flow** | **(765.63)** | **(32.57)** | **57.65** | **185.93** | **96.73** | **127.15** | **195.90** | **460.85** |
| Pay back |  | (798.20) | (740.55) | (554.61) | (457.88) | (330.73) | (134.83) | 326.01 |

**\* 2005 values**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Discounted Cash flows and NOPAT - Continuous Livestock system - USD/hectare** | | | | | | | | |
|  | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** |
|  |  |  |  |  |  |  |  |  |
| **Gross Revenue** | **0.00** | **147.73** | **166.28** | **195.46** | **156.34** | **194.51** | **236.54** | **182.01** |
| Sales Taxes (-) | 0.00 | 1.99 | 2.24 | 2.37 | 2.19 | 2.47 | 2.57 | 2.19 |
| **Net Revenue (+)** | **0.00** | **145.74** | **164.03** | **193.09** | **154.15** | **192.04** | **233.98** | **179.82** |
| Production Cost (-) | 0.00 | (100.16) | (112.73) | (119.02) | (110.26) | (124.26) | (129.04) | (110.05) |
| **Gross Profit** | **0.00** | **45.59** | **51.31** | **74.07** | **43.88** | **67.78** | **104.94** | **69.77** |
| Operating expense (-) | 0.00 | (4.41) | (4.96) | (5.24) | (4.85) | (5.47) | (5.68) | (4.84) |
| **Operating Profit (EBIT)** | **0.00** | **41.18** | **46.35** | **68.84** | **39.03** | **62.32** | **99.27** | **64.93** |
| Income Tax(-) | 0.00 | (11.32) | (12.75) | (18.93) | (10.73) | (17.14) | (27.30) | (17.86) |
| **Net Operation Profit After Taxes** | **0.00** | **29.86** | **33.60** | **49.91** | **28.30** | **45.18** | **71.97** | **47.07** |
| Depreciation (+) | 0.00 | 3.59 | 4.04 | 4.26 | 3.95 | 4.45 | 4.62 | 3.94 |
| **Operating Cash Flow** | **0.00** | **33.44** | **37.64** | **54.17** | **32.25** | **49.63** | **76.59** | **51.01** |
| Investment (-) | (173.73) |  |  |  |  |  |  |  |
| Residual Value |  |  |  |  |  |  |  |  |
| Working Capital (-) |  |  |  |  |  |  |  |  |
| **Cash Flows** | **(173.73)** | **33.44** | **37.64** | **54.17** | **32.25** | **49.63** | **76.59** | **51.01** |
|  |  |  |  |  |  |  |  |  |
| Discounting Fator | 1.00 | 1.09 | 1.19 | 1.30 | 1.42 | 1.55 | 1.69 | 1.85 |
| **Discouted Cash Flow** | **(173.73)** | **30.63** | **31.58** | **41.62** | **22.69** | **31.99** | **45.22** | **27.59** |
| Pay back |  | (143.09) | (111.52) | (69.90) | (47.20) | (15.21) | 30.01 | 57.59 |

**\* 2005 values**

1. These values were established after discussions with farmers and consultants who worked in the region in 2005. [↑](#footnote-ref-1)
2. It was established in 1995 in Brazil, the Credit Guarantee Fund. This institution, linked to the National Monetary Council and the Central Bank, set rules and guarantees for investments in the capital market in Brazil. In the set of rules there is the definition of the maximum guaranteed to the creditor in events of financial difficulties of the agencies that are depositories of its resources. Currently, this value is R$ 250,000.00. For more information about this, visit: http://www.fgc.org.br/ [↑](#footnote-ref-2)
3. This bond is taken as a reference to the capital market brokers to define the expected return to be paid to its customers. The final amount was deducted from the income tax. CDB interest in 2005 was 17.56%. [↑](#footnote-ref-3)