<u>**NTT FEM User's Manual**</u>

NTT-FEM is a user-friendly interface within NTT that enables simulation of FEM using the same input specified in NTT for APEX. Therefore, users must run the NTT model before running the FEM model. To simulate FEM, user data entered in NTT are transferred to FEM through a linkage routine within the NTT interface and in FEM. The FEM model simulates farms holistically, so regardless of the size of the area of interest, the FEM model simulates entire representative farms to capture the full economic effect of the scenario. A set of representative farms are already included within the NTT program for this purpose. Once economic simulations are completed in FEM, the output is read in by the NTT interface.

The FEM results screen displays total revenue, total cost, and net returns. The FEM model estimates total revenue from crop sales by using the crop yield produced by the NTT model and the per-unit crop selling price. FEM also estimates the corresponding costs using a wide array of subroutines, functions, and algorithms. For crop enterprises, the estimated cost comprises various activities associated with crop production, such as land ownership costs, labor cost, machinery and equipment expenses, electricity charges, fuel prices, fertilizer, application cost, etc. The third variable displayed in the results screen, Net Returns (also referred to as Net Income), is just the difference between Total Revenue to Total cost. FEM also includes capabilities for simulating a wide spectrum of livestock operations. The following steps should be followed for running the FEM model.

- In order to estimate the economic effects of BMP implementation for crops, users must select either all BMPs or anyone which the NTT model has already simulated. Next, select the check box under the Select option, click on the Economic & Water Quality Simulation tab, and wait until NTT displays "x scenarios simulated successfully" in the green banner at the top, where x is the number of scenarios simulated. Figure 1 illustrates the selection of three BMPs to determine their economic effects for a Corn-Soybean crop rotation.

Figure 1: Three scenarios are selected in the NTT-FEM interface

- Now, click the Economic Results option in the left pane to view the Economic effects of the selected BMPs. Table 1 shows the Total Revenue (Crop/Feed Sales, and Livestock Sales), Total Cost (Field Variable Cost, Overhead Cost, and Other Cost), and Net Returns corresponding to the three BMPs shown in Figure 1 (Corn_Soybean_Intensive_tillage, Reduced_tillage, and No_til). Change (%) under the Reduced_tillage and No_till options show % change comparing to the baseline (Corn_Soybean_High_Till).

The Field Variable Cost, Overhead Cost, and Other Cost are components of the total cost that comprise the following specific costs:

  o Field Variable Cost includes Machinery Variable Cost, Additional fertilizer Cost, and Field labor Cost

  o Overhead Cost includes principle and interest payments, and depreciation, and cost of equity capital.

  o Other Costs include feed costs as applicable, facility maintenance costs, other crop input costs, lease land cost, livestock purchase costs, manure hauling costs, and other costs depending on the farm type.

The first column in Table 1 displays the economic indicator that is indicated in the respective columns for each scenario (Total Revenue, Total Cost, and Net Returns) associated

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with a Corn-Soybean rotation implementing various BMPs in a particular field. The second column represents the baseline (the first scenario) and shows the per acre revenue accruing from crop sales (total revenue), the cost required to produce the crops in a unit acre of land (total cost), and the per acre net returns (Total Revenue minus Total Cost). The third column represents per acre revenue, cost, and net return corresponding to the second scenario (in this case, Reduced Tillage BMP). The fourth column represents the economic impacts expressed as percentage changes from the baseline – percentage change from baseline (Corn_Soybean_High_Till) to Corn_Soybean_Reduced_Till. A similar economic interpretation can be made for the fifth and sixth columns corresponding to Corn_Soybean_No_Till BMP.

Table 1: Economic impacts of BMP implementations on a Corn-Soybean crop rotation.

Project: Allegany_Maryland

Location (Allegany, Maryland)
Economic Input Information
Fields (AOI1)
  Soils
  Weather
  Management Scenarios
  Water Quality Results
    Tabular
      All Years
      Dry Years
      Wet Years
    Charts
      Annual
      Monthly
  Economic Results
  APLCAT
  Results
Utility Files
Field Routing (Watershed)

Home » Projects » Allegany_Maryland » Fields » AOI1 » Results
Select up to 3 scenarios for view
Corn_Soybean_Hig ▾   Corn_Soybean_Re ▾   Corn_Soybean_No_ ▾   [View]   Download PDF

Description	Corn_Soybean_High_Till	Corn_Soybean_Reduced_Till		Corn_Soybean_No_till	
	$/ac.	$/ac.	Change(%)	$/ac.	Change(%)
Total Revenue	851.56	865.51	13.9 (1.6)	840.49	-11.1 (-1.3)
Crop/Feed Sales	851.56	865.51	13.9 (1.6)	840.49	-11.1 (-1.3)
Livestock Sales	0.00	0.00	0.0 (NaN)	0.00	0.0 (NaN)
Total Cost	268.62	221.26	-47.4 (-17.6)	218.99	-49.6 (-18.5)
Field Variable Cost	77.38	55.48	-21.9 (-28.3)	56.64	-20.7 (-26.8)
Overhead Cost	189.49	164.03	-25.5 (-13.4)	160.60	-28.9 (-15.2)
Other Cost	1.75	1.75	-0.0 (-0.0)	1.75	0.0 (0.1)
Net Return	582.94	644.25	61.3 (10.5)	621.50	38.6 (6.6)

The economic values, as shown above, are estimated based on a national database developed by the NTT team at TIAER. However, as the specific economic input data varies markedly from one location to another, NTT provides options for users who wish to change certain input data to reflect their specific situations. There are four options available in the left pane of the screen for editing input data, namely: General Inputs, Commodity Prices, Equipment, and Facilities. Click the relevant option(s) and change the values as needed. Under the General Inputs option, we can find labor wage, land value, Diesel price, Electricity price, and Gasoline price. Under the Commodity Prices option, the purchase/selling price of feeds can be viewed/edited. Under the

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Equipment option, users can view and edit details of the types of equipment and their prices. Similarly, under the Facilities option, users can view and edit the details of the facilities used on the farm for various economic activities, such as barns, parlors, feedlots, and structural BMPs. Table 2 displays the input options is available in the FEM model.

Table 2: The economic input information

**Project:
Allegany_Maryland**

- Location (Allegany, Maryland)
- **Economic Input Information**
  - › General Inputs
  - Commodity Prices
  - Equipment
  - Facilities
- Fields
- Field Routing (Watershed)

Home » Projects » Allegany_Maryland

General Inputs

`Reset to default`

Name	Unit	Value	Actions
Average labor wage	$/hr	12.0	✎
Default land rental rate	$/acre	139.0	✎
Default land value	$/acre	2000.0	✎
Diesel price	$/gallon	3.11	✎
Electricity price	cents/khr	0.15	✎
Electricity purchase price	cents/khr	0.0	✎
Electricity sale price	cents/khr	0.0	✎
Gas price	$/gallon	3.39	✎
Haul to compost distance	mile	20.0	✎
Haul to spread distance	mile	5.0	✎
Time horizon	yrs	2.0	✎

Once the user has modified the input data, they can simply follow the procedure described above to estimate the economic impacts of alternative BMP scenarios.