

# Perdue MicroStart 60 Fertilizer

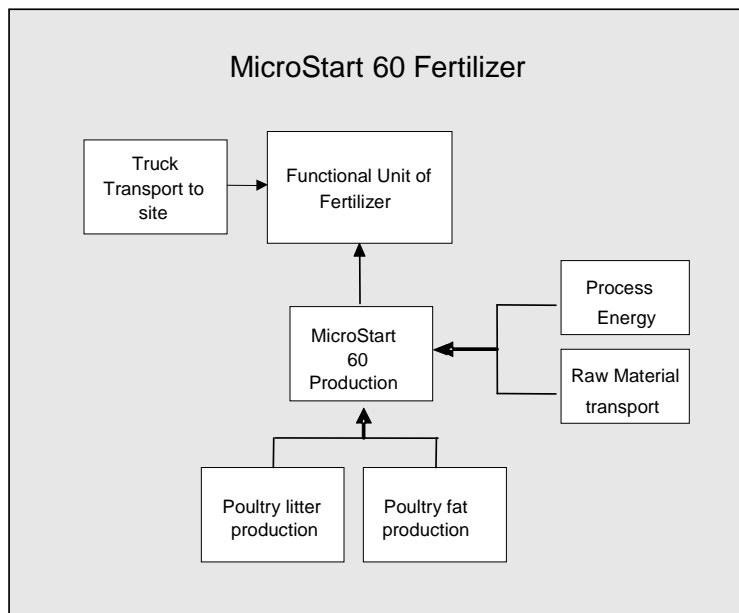
## Product Selection and Description

Perdue AgriRecycle's MicroStart 60™ is a slow-release nitrogen fertilizer consisting almost entirely of chicken litter, a byproduct of the poultry industry. Its Nitrogen-Phosphorus-Potassium (NPK) ratio is 4-2-3.

For the BEES system, the functional unit for fertilizers is applying 10 kg (22 lb) nitrogen per acre for a period of ten years. A typical application of MicroStart 60™ is 318 kg (700 lb) per acre. As the nitrogen in one application is released over a period of three years, fertilizer use per acre, per year, is 106 kg (233 lb). To achieve a 10 kg (22 lb) nitrogen per acre requirement, however, this amount is scaled up to 245 kg (540 lb) of fertilizer per acre per year.<sup>1</sup>

## Flow Diagram

The flow diagram below shows the major elements of the production of this product, as it is currently modeled for BEES.



**Figure 1: MicroStart 60™ Fertilizer System Boundaries**

## Raw Materials

Microstart 60 is composed of raw poultry litter and poultry fat, in the proportions shown in the Table below.

**Table 1: Microstart 60 Constituents**

<b>Constituent</b>	<b>Mass Fraction (%)</b>
Raw poultry litter	99.9
Poultry fat	0.1

The raw poultry litter is a byproduct of the poultry industry and would otherwise be a waste product. Therefore, any impacts associated with its production, such as chicken farming and poultry production, are allocated to the production of the poultry, not the litter. Wastewater generation from poultry production processes is accounted

<sup>1</sup> While this may not be the manufacturer's suggested rate of use for this product, an adjustment was made to enable comparison of BEES fertilizers on a functionally equivalent performance basis.

for in the context of poultry fat production; poultry fat accounts for 0.1 % of the inputs to these processes.<sup>2</sup>

## Manufacturing

**Energy Requirements and Emissions.** Electricity and #2 diesel oil for a generator are among the energy requirements for manufacturing. Steam is generated from a 74.6 kW (100 hp) boiler, for palletizing and heating the finished product, for use of a scrubber, and for dust control. Approximately 472 MJ (131 kWh) and 0.04 m<sup>3</sup> (10 gal) of diesel are required to produce one ton (2 000 lb) of fertilizer. Electricity is modeled using the U.S. average electric grid from the U.S. LCI Database. Diesel fuel production data comes from the U.S. LCI Database, as does a portion of the data used to represent its combustion in a boiler. Data for some of the diesel emissions is provided directly by Perdue AgriRecycle, and is included in the BEES model as follows.

**Table 2: Microstart 60 Manufacturing Emissions**

<i>Air Emission</i>	<i>g/kg (lb/ton)</i>
Nitrogen Oxides	1.24 (2.48)
Carbon Dioxide	1.61 (3.21)
Sulfur Dioxide	1.61 (3.21)
Particulates (unspecified)	1.23 (2.45)
Ammonia	0.48 (0.95)

**Transportation.** The raw litter is transported an average of 120 km (75 mi) and the poultry fat 161 km (100 mi) to Perdue AgriRecycle's facility.

**Water Effluents.** About 10 tanker loads of water effluents per week are generated from manufacturing Microstart 60™. However, this water is beneficially applied on land for irrigation, so is not modeled as a wastewater or as specific water effluents.

## Transportation

Truck and rail are both used to ship Microstart 60™ to customers located across the United States. The transportation distance is modeled as a variable of the BEES system, with burdens shared equally by truck and rail.

## Installation

Any burdens that may arise from on-site application of fertilizer are not accounted for in BEES.

## Use

The nitrogen in the fertilizer is released over a three-year period. Microstart 60™ is fully biodegradable.

## End of Life

There are no end of life burdens for this product since it is fully consumed during use, eliminating the need for waste management.

## References

### Life Cycle Data

National Renewable Energy Laboratory (NREL): *U.S. Life-Cycle Inventory Database*. 2005. Golden, CO.

Found at: <http://www.nrel.gov/lci/database>.

World Bank Group, "Meat Processing and Rendering," *Pollution Prevention and Abatement Handbook* (World Bank, July 1998). Found at:

[http://lnweb18.worldbank.org/essd/essd.nsf/GlobalView/PPAH/\\$File/65\\_meat.pdf](http://lnweb18.worldbank.org/essd/essd.nsf/GlobalView/PPAH/$File/65_meat.pdf).

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<sup>2</sup> World Bank Group, "Meat Processing and Rendering," (World Bank, July 1998). Found at: [http://lnweb18.worldbank.org/essd/essd.nsf/GlobalView/PPAH/\\$File/65\\_meat.pdf](http://lnweb18.worldbank.org/essd/essd.nsf/GlobalView/PPAH/$File/65_meat.pdf).

## **Industry Contacts**

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