Short introduction to FarmNTool

FarmN is a web-based, whole-farm model for nitrogen flow. It is a prototype internet-based advisory tool, the aim of which is to assist farmers and environmental regulators to agree on the production and losses of N to the environment under current and future conditions on a particular farm.

The pages are available in Danish and English; the language is chosen on the first page.

Here one also has to login. If the user does not have a login name, one can choose to use the demo login. When the demo login is activated a new user, farm and scenario is created and the user has all functionalities of the system. When the browser is closed or the session is timed out, the user and all data put into the system will be deleted.

FarmNTool consists of 9 tab-pages of which the user can input data on 5. This is a short introduction to help users getting started with the tool.

This system measures energy in SFU (Scandinavian Feed Units). For example 12 SFU ≈ 1 MJ for metabolisable energy.

All changes made on tab-pages must be saved before moving to a new tab-page.

| **Farm** | Field | Rotation | Cattle | Pig | Manure | Balance | Result | Documentation |

Purpose: To define static information on the farm.

- Farm type is important for soil calculations.
- One can have one or many scenarios. This means one can compare current and future management situations.
- Manure bought and sold can be specified for each scenario, although sold manure will be overruled later, if insufficient is produced on the farm.

| Farm | **Field** | Rotation | Cattle | Pig | Manure | Balance | Result | Documentation |

Purpose: To define the crop production

- Based on the crops entered in a crop rotation, the optimal sequence of cropping is calculated and shown on the Rotation tab-page. The aim is to optimise the utilisation of N carry-over effects between crops.
- It is possible to change the farm defaults for irrigation, yield and soil type for each rotation. The soil calculations will then take these changes into account.

The FarmNTool can be accessed at: http://www.farm-N.dk/FarmNTool

Purpose: To input information on field management

- Based on the optimal cropping sequence, field management can be entered. This will affect subsequent calculations.
- The yield data are expressed in SFU.
- If the crop is produced for sale, it is not available for feeding. If surplus feed is produced, the surplus will be sold, even if it has not been requested on this page.
- If a crop cannot use animal manure then it should be indicated on this page. The system is then forced to buy mineral fertilizer to fulfil the N-need of this crop, even if there is sufficient manure on the farm to satisfy the N requirement of the crop.
- Note: The straw-use is very important for the calculations regarding soil N changes.

Purpose: To input information on cattle production

- Danish standard production values are shown when the user chooses a cattle type. These can be overwritten with the users actual production if necessary.
- Energy intake is calculated based on production. The N-demand for the different cattle types is calculated using assumed N efficiencies (e.g. 26.3% for dairy cattle). This can be adjusted by altering the Efficiency percentage e.g. if Efficiency is set to 90%, the N efficiency will be 23.4%. The N requirement will then be increased but the dry matter and energy requirements will be unaltered.
- The choice of housing type is important as it determines the need for bedding, the type of manure produced and the gaseous losses of N from housing and manure storage.

Based on the number and productivity of the animals, the herd energy and N requirements and manure production are shown.

Purpose: To input information on pig production

- For sows, the production is input as number of live piglets produced per year and their weight at weaning. Danish standard values for energy requirement and protein content in the fodders are shown but can be overwritten. The energy unit is SFU and covers all the energy needed for the sow and piglet maintenance and growth.
- For weaners and finishing pigs, the production input is the number of animals produced annually, plus the start and end weights. Here the energy requirement is the amount required for a weaner or finishing pig to grow from start to end weight.
- Housing type influences how manure is partitioned into storage, as well as gaseous N loses from housing and storage.

Depending on inputs, numbers relating to the total pig herd requirements and manure production are shown.

Purpose: To show how the manure is distributed on the fields

There is no input on this page.

- First the amount of mineral fertiliser bought is calculated, based on Danish regulations and rules regarding manure and fertiliser use. The actual manure produced on the farm is then calculated, and distributed among crops to achieve optimal utilization.
- If there is manure, which could not be distributed to the fields, a warning will be written on this page saying that the excess manure has been sold and the equivalent fertiliser has been bought.

The user need not visit this page, its purpose is only to show the distribution of manure.

Purpose: To show the internal N-flow

There is no input on this page.

- On this page it is important that 'Internal turnover' is close to zero, otherwise the manure distribution will not be correct. This number gives the difference between the energy that the user indicated should be grazed (on the Rotation page), and the energy the cows will actually graze (on the Cattle page).
- This page gives the user the chance to view the consequences of previous choices and adjust the appropriate inputs on previous tab pages if desired.

Purpose: To show the external N-flow

- The inputs of N to the farm are from fertilizer, manure, fodder, livestock, seeds, atmospheric deposition and fixation.
- The N outputs from the farm are as crop products, livestock, meat, milk, manure and fodder.
- The N surplus of the farm is the difference between the two figures.
- Finally, the N surplus is partitioned into ammonia volatilisation, dinitrogen and nitrous oxide emissions due to denitrification, nitrate leaching and changes in the N stored in the soil. The gaseous emissions are presented separately for the animal housing, manure storage and fields. The estimate for N leaching is calculated by difference.

Only little documentation is available at present, but what we have is to be found on the Documentation tab-page.

If you have any comments or questions about the system, please contact farmN@agrsci.dk

The FarmNTool can be accessed at: http://www.farm-N.dk/FarmNTool