

FarmTracker: an integrated approach to physical farm management

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Introduction

FarmTracker is a computer program which integrates an inventory of farm resources; farm mapping; recording and analysis of paddock and stock inputs, management actions and production (event histories); and planning tools including a pasture growth model (GROW) and a feed budget. This paper describes FarmTracker and the uses of the program in farm management.

FarmTracker was developed based on the experiences of farmers and consultants with an earlier package, written by the author, called GRAZE.

FarmTracker design

FarmTracker is a very comprehensive package and much effort has been directed to the successful integration of all aspects of farm monitoring and planning (Figure 1).

Critical in the design of FarmTracker was the requirement to use the program for any pastoral, cropping or farm forestry production system. FarmTracker was also designed to meet the widely differing recording and planning needs of users which range from simple stock and paddock recording to its use as the basis for complex farm systems modelling. Flexibility in the definition of farm resources and the design of event records is the key to this.

FarmTracker has been developed in Turbo Pascal for MS-DOS machines. The user interface (text-mode) has been designed for intuitive use particularly with a mouse, using pull-down menus, dialogue boxes and special data entry forms and tables. A

graphical user interface has been designed for editing and displaying farm maps.

There are three main screens (or modes) in which the three main functions of farm creation (Figure 2), event/history recording and analysis and planning are carried out. Each screen is composed of six boxes representing farm "enterprises", "stock", "paddocks", "feed" and "resources, mapping, weather or predictions".

Figure 1

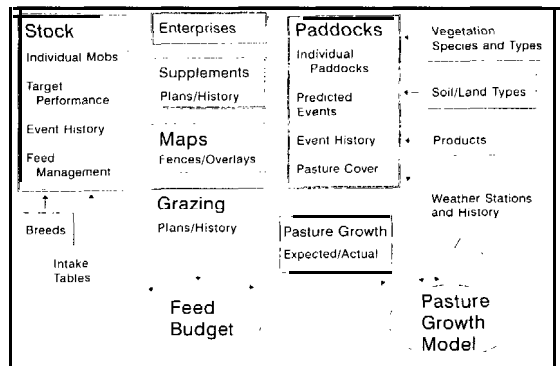
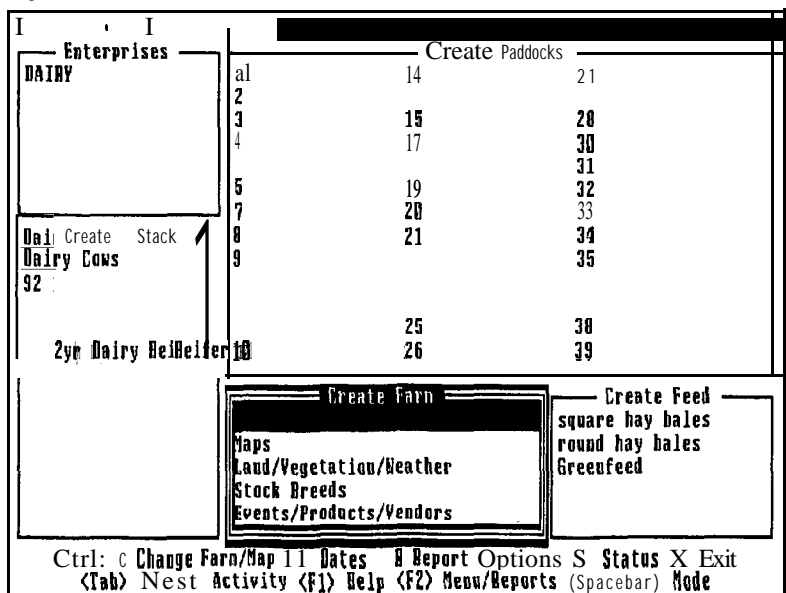


Figure 2



Farm resources

In order to create a farm on a computer the basic resources of that farm need to be defined. These include land types and land use capability, vegetation types (pastures, crops and weeds), soils, soil nutrient status, subdivision and paddock identification, water reticulation, drainage, enterprises, stock breeds and classes, and pasture and supplementary feeds. These resources are all defined by the user although sets of defaults may be created for any specific situation.

Two levels of information are required for many of these resources. On one, level they are defined very simply so they can be selected from lists during event recording (for example, selecting pasture species when **regrassing**). On the next level they contain all the information required for detailed planning or prediction tools (for example, definition of a stock breed to predict wool growth or carcass grading).

Product and vendor lists are also created in **FarmTracker** for use in event records. Products include fertilisers and a range of agricultural chemicals and animal health products.

Event histories

FarmTracker contains two types of events. The first are those for which the record format is pre-defined and cannot be changed. These include pasture covers, vegetation changes, soil tests and **herbage** analyses, and grazing records.

The second type of record is defined by the user to meet the recording and analysis requirements of a specific situation. These can be created in **FarmTracker** by drawing a data entry form and defining the type of data format required. The data format may be a "general" type (which includes dates, text, integer and real numbers) or a "predefined" type. The latter include date types (start date, end date, due date), stock data types (stock transaction types, liveweights, condition scores, production types), paddock data types (area, yield), selection data types (select from lists of vegetation types, products, vendors, stock) and financial data types.

The use of "predefined" data types is important particularly for report design. For example, all the

stock transaction data types are used in the stock reconciliation report; the fertiliser data type is used in the fertiliser use report.

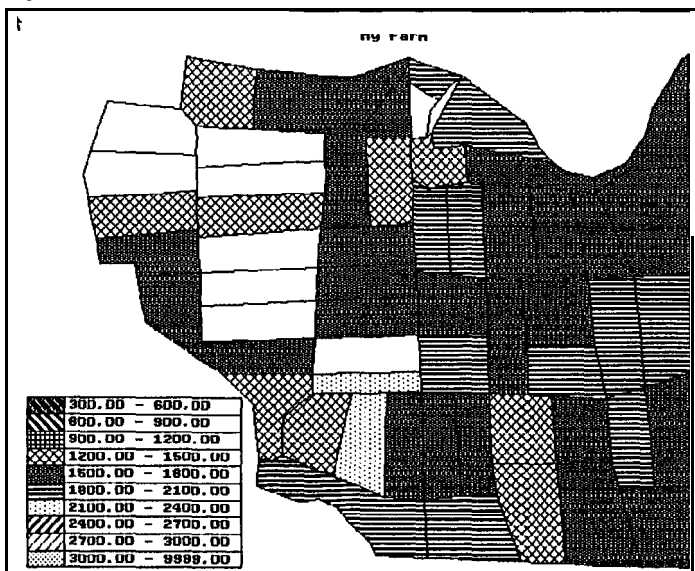
For simplicity, a large range of recording forms have been designed and put together in a master list. Individual users can select from this list the recording forms they wish to use.

All event history information may be reported in tables, graphs, on-farm maps and a range of special reports (e.g. stock reconciliation, fertiliser history). Tables may also be designed by the user and give much flexibility in the types of reports that can be produced. Relationships between event histories and farm resources, paddock and stock status information, and weather information can be explored.

Farm maps

Farm maps are a key element in the planning and reporting processes of **FarmTracker** (Figure 3). Maps are digitised from aerial photographs of the farm. Digitising is generally done within a Geographic Information System such as **ArcInfo** or within **AutoCAD**. **FarmTracker** map files may be created from **ArcInfo** "UNGEN" or **AutoCAD** "DXF" file formats or using **FarmTracker** digitising routines.

Figure 3



Overlays of land units and subpaddocks (including vegetation), water supply, drainage, roads, streams and rivers, and any other information can be digitised or drawn on the maps using a mouse or the keyboard.

Areas or lengths can be calculated. The types and condition of fences, water pipes, drains and fittings are recorded and associated with lines and symbols of different colours and types on the screen. Planning of new works and maintenance activities can therefore be done directly on the maps.

Farm plans, targets and predictions

FarmTracker contains comprehensive routines for setting stock, paddock and feed targets. Actual event histories may be graphed against targets.

Pasture growth curves are entered using a half-monthly time step and are related to individual pasture types. The pasture growth model (GROW) predicts

daily growth rates using individual paddock and weather records. Growth predictions may be linked directly into the feed budget. Feed budgets are calculated using all available target and pasture growth information.

A farm simulation model (**FarmORACLE**) has also been developed by the author for the Veterinary Clinical Sciences Department, Massey University. This model uses the farm resource and planning information of **FarmTracker** to predict farm production.

Detailed grazing management plans may be devised and these may be done by selecting individual paddocks directly on the farm maps. Feed budgets may be done on the area of the farm selected for individual stock mobs and these plans are used in **FarmORACLE**.

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