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AN INTERNATIONAL COMPARISON OF FARM ACCOUNTING SOFTWARE

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ABSTRACT

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Three accounting packages for farmers are compared by using an evaluation form. The packages originate from the USA, Germany and The Netherlands. Differences are considerable and can only partly be explained by differences in national accounting practices. Decisions of the software makers on product and marketing policy seems to be very important too. If these decisions can not be explained by differences in agricultural practices in the three countries, more international cooperation could benefit software makers and farmers.

Farm accounting/Software/Netherlands/USA/Germany

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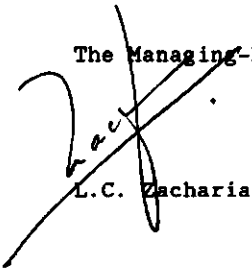
Preface

This report contains a comparison of three accounting packages for farmers. It is an international comparison that reveals several differences in software engineering as well as in national accounting practices in farming.
Therefore not only softwarehouses but researchers and professionals in farm accounting as well might find this report of interest.

The Managing-Director,



The Hague, November 1991

L.C. Zachariasse

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1. Introduction

The agricultural software industry is characterised by high fixed costs and therefore by economies of scale. The number of farmers, interested in an accounting package dedicated to agriculture, looks fairly low. Given these characteristics, to expect an international industry, more or less comparable to the suppliers in the spreadsheet or word processing market, would be theoretically reasonable. In practice however farm accounting software is supplied by small national companies, without many cross border activities. There is even a lack of knowledge on developments in other countries.

In this paper we compare three accounting packages used by farmers: one from the Netherlands, one from the United States and one from Germany. The comparison is a starting point to discuss the influences of national accounting practices in farming on the available software. The conclusions are not only of interest for the further development of national packages but for discussions on the possibility of international cooperation as well.

2. Method

A comparison between software packages can be made by evaluating the packages on the same set of objective criteria. To improve the evaluation of farm accounting software, Olson (1987) proposed an evaluation form. This form will be used here, but we made some minor changes to adapt the form to this international comparison and to incorporate up-to-date criteria of user-friendliness. We also changed the sequence of some of the items in Olson's evaluation form. All these changes are documented in annex 1.

Data on the three accounting packages are given in Figure 2.1, which actually is the adapted first part of Olson's evaluation form. For Germany we used HANNIBAL, a package developed for use in accounting offices in the farm sector and by farmers. It is highly successful in the south of Germany (Bavaria,

	Hannibal -Germany	Red Wing -USA	Ricardo -Netherlands
Version	5.0	2.0 a)	1.02
Released in	1989	1986	1990
Name of company	Agrosoft GmbH	Red Wing Business Systems	Agridata
Address	Munich	Rd Wing MN	Den Bosch
Type of vendors:			
- accounting offices	yes	no	yes
- computer shops	no	yes	no
- direct sale	no	sometimes	no
Number sold (spring 1991)	2000 b)	2500 c)	300
Price	DM 1750	$ 495	f 2500
Used by:			
- farmers	yes	yes	yes
- (ag.) accountants	yes	yes	no
- small businesses	no	yes	no
Minimum requirements:			
- operating system	MS-DOS	MS-DOS	MS-DOS
- RAM memory	512 KB	256 KB	450 KB
- disk drives	harddisk	2 floppies	harddisk
Supports colour-screen	yes	yes	yes

Figure 2.1 General information on the three accounting packages
a) version 4.0 was released in december 1990; b) accountans use it for another 6000 clients; c) and 2500 to non-farm businesses.

Baden-Württemberg and Hessen). The leading package in the north of the country, AS-BILA, is in concept and in user interface quite similar. For the United States RED WING'S GENERAL LEDGER was chosen as a representative package. It is sold all over north America, to farmers as well as to small businesses and accountants. It is made by an independent software company and mainly sold through rural computer shops. RICARDO is the name of a recent Dutch accounting package, developed by a software company in cooperation with two farm accounting organisations.

Figure 1 reveals some striking differences in the marketing policy of the three software companies. The American RED WING is mainly sold through computer shops to very different types of costumers: farmers, accountants as well as non-agricultural firms 'in Main Street, rural USA'. This marketing strategy implies a general type of general ledger, not too much customised to farming. In addition specific decision aids for farming are sold. The German HANNIBAL is also used by accountants as well as by farmers, but it is totally committed to agriculture. The product policy is to establish compatibility between the farmer and his accountant by installing the same package in both places: the manual even prescribes that it is not allowed to enter new data while the database is with the accounting office. The Dutch RICARDO also relies on the support of the farmers accountant, but not necessarily by using the same software. The philosophy of the package is that it wants to support the daily (tactical and operational) decisions of the farmer, leaving most of the work on the yearly balance sheet to the accountant.

3. The farmer as an accountant

Farmers see themselves as having to earn their money by working and making decisions in the barn or on the field and not by making accounts. Accounting gives an insight in liquidity and profitablity but most farmers (at least in Europe) leave these tasks to a professional, especially if they do not have a computer.

First of all this raises the question if it makes sense to bring the accounting tasks back to the farm. We will not address this question here in full detail, but it is clear that the answer depends, among other things, upon:

- the availability and costs of professionals: if relatively cheap consultants are available, sharing out is more attractive;
- the complexity of fiscal regulations and the know-how of the farmer: if regulations are more complicated (as seems to be the case in the Netherlands compared to Germany and the U.S.A), sharing out is more attractive;
- the availability of an on-farm computer: if a computer is already available on the farm, installing an extra program becomes cheaper and will be easier. In a society where computers are more wide-spread, doing the accounts yourself is more attractive;
- the availability of time: sharing out is more attractive for farmers who face a heavy work load, like (bigger) dairy farmers, because the opportunity cost of their labour is higher;
- the usefulness of the data: keeping the records on the farm is more interesting if they have a direct and clear meaning for the day-to-day decisions that the farmer has to make.

Secondly, it means that sellers of accounting packages to farmers are operating in a difficult market because they have to create their demand by convincing farmers that accounting can be an interesting activity. They also have to train these new convicts in bookkeeping. That makes high demands upon the instructions in the manual and the system (table 3.1) and the ease of use (table 4.1).

3.1 Manuals

All three manuals have a clear lay-out, show images of the screen in the manual and provide a set of sample data. But there are differences too. All three assume that the user does not need much support on the computer and MS-DOS itself, but RED WING provides a glossary on computer terminology.

The biggest question that the software companies face here is the amount of instruction that the farmer needs on accounting. The German HANNIBAL expects the user to be familiar with agricultural accounting. Step-by-step instructions for beginners in accounting are not available: the manual is organised by describing all the menus with great detail. The explanation of the complex German chart of accounts has been compressed in three pages. The possibility to introduce accounts for stocks and the use of materials is written for insiders in bookkeeping, not for farmers (manual: page 86).

The manual of the American RED WING is more helpful to novices in accounting. It contains three important parts; first a practicing system in which a user learns to use the most important functions, like printing the chart of accounts, add an account or enter a transaction. Second, a chapter with helpful procedures. Very helpful for a user is the classification into

	Hannibal -Germany	Red Wing -USA	Ricardo -NL
Manual:			
Format of the manual	A5	A4	A4
With step-by-step instructions for beginners	no a)	yes	yes
With separate abbreviated instructions for experienced users	no	no b)	no
Shows an 'image' of the screen and the steps to reach it	yes	yes	yes
Is reproduced by a high-quality method	yes	yes	yes
Uses colour to highlight points	no	no	no d)
Is indexed by subject and command	yes	yes	no
Includes a glossary	no	yes c)	no
System:			
Includes a tutorial	no	no	e)
Provides a set of sample data	yes	yes	yes
Provides a trouble-shooting guide	no	d)	no

Figure 3.1 Instructions in manual and system
a) Manual focuses on detailed descriptions of all the menus, their function in the programm and the data that can be entered; b) the reference guide in the manual describes all the menus, their function in the programm and the data that can be entered; c) on computer terminology only; d) under revision; e) in the manual

daily, end-of month, quarterly and end-of-year procedures. The third part is the reference guide, which is more or less comparable to the HANNIBAL manual. It describes all the different menus. The description of the menus is excellent. The lay out of the A4 format is clear and leaves space to make some notes in the margin. The description for each menu is grouped into four categories: "purpose" (explains what the selected menu is designed to do and when it should be used), "prerequisites/restrictions" (tells the steps to be taken before or the limitations), "definitions" (describes all the questions / fields in the menu and the possible answers) and "behind the scene" (describes how information entered will effect the database). This classification makes it possible to locate very quickly the part of the text which the reader is interested in. The glossary however is only on computer terminology and not on accounting terms.

The Dutch RICARDO devotes much of its manual to introduce accounting to farmers. Compared to the other two packages it allocates even more space than RED WING to explain how data have to be coded by using the chart of accounts. For one of the Dutch provinces nearly all invoices that farmers in dairy and arable farming receive have been reproduced with a comment on the accounts to be used when coding these transactions. Compared to the other manuals the description of the menus is not as extensive. A lot of screens are not discussed at all. This however is not as negative as it looks, as it is compensated by a more extensive, easy to handle, help facility in the program.

4. Type of accounting

Accounting comes in different layers of complexity. Cash accounting provides only for a recording of all monetary flows to and from the farm business and the farm family. By the use of a balance sheet accrual accounting separates output and costs from receipts and expenses and matches output and costs in order to calculate a profit. This can simply done with the single-entry method by only recording debts and assets. All three packages use the method of double-entry accounting: a systematic recording of all changes in net worth by composition and size. It gives a picture of the net worth of the business as well as the details of the changes in net worth due to the components of the profit. In a computerized accounting procedure the differences between single-entry and double-entry are rather small. Although the standard charts of accounts in the programs are suited for double-entry accounting, the systems also provide for single-entry accounting (by recording monetary flows only) and for cash-accounting (by omitting the balance sheet).

4.1 Accounting year

More important for a farm business than the differences in the type of accounting are the other options in figure 4.1. All three packages save the individual entries after posting, which means that no information is destroyed and stays available for later analysis. An important feature for agricultural businesses is a free choice in the accounting year. Some farmers use the calendar year, others a crop year (e.g. May 1st - April 30 in the Netherlands or July 1st - June 30 in Germany). In most countries the fiscal year is the calendar year. Although all three packages provide the user with a choice between calendar year and crop year, it is not always clear if the system has facilities to differentiate this choice between the farm business and personal reports. In the Netherlands the profit of the crop year May 1st 1989 - April 30 1990 can be the farmer's income in the fiscal calendar year 1990. Non-farm income and tax deductable personal expenses have to be calculated on a calendar year basis. RED WING has a very flexible crop year facility. For each entry the crop year can be added as an extra data item. Results per profit centre can then be calculated on a crop year basis, additional to the accounting year which itself not necessarily has to be the calender year. That makes it possible to have an accounting year from the first of July till the end of June and a March - February crop year. It makes it also possible to allocate costs in one accounting year to a profit centre in another crop year. So cost of seed for oil seed rape, planted in autumn of accoun-

ting year 1990 can be treated as fiscal costs in that year, but at the same time allocated to the 1991 crop year in which also the sale of the produce will be recorded. In the analysis menus of RICARDO every possible time period can be specified.
The charts of accounts of all three systems separate business and personal transactions. That does not necessarily mean that reports are also split in a report for the farm and a report for the personal assets and debts. HANNIBAL for instance has one integrated balance sheet for farm and family. RED WING gives of course a partnership breakdown of the income for all profit centres. RICARDO has special reports for the personal business of the farm-partners.

4.2 Partnerships

The generally accepted accounting principles as well as fiscal obligations influence this aspect of the reports. In the Netherlands for instance a car can be treated as a business or as a personal asset, and the choice has fiscal implications.

A split between business and personal reports is more important if the system allows for partnerships in which the farm has multiple operators. In some countries, like the Netherlands, father-son partnerships are a common method for the intra-generational transfer of the family business. The option to deal completely with multiple owners is a big complication for a system. HANNIBAL solves these complications exemplary. In the cash flow statement private transactions are listed for each owner (manual: page 94) and entries for transactions from one owner to another are also possible (manual: page 98). There is a special menu available to record the partition of the profit among the partners, which results in a journal entry. This menu allows for a partition in percentages or in D-Mark. In Dutch practice the partition is often made on the basis of the capital and labour input of the partners, an option not directly supported by HANNIBAL. In that case one has to do the calculations manually before entering the D-Mark values.

RED WING does not support the partition of the profit with a special menu, but has another very interesting feature: for each profit centre up to three partners and their share in the profit centre can be defined. This can be used in a case with multiple owners to handle their private expenses and income, but also to solve complicated partnerships, like those father-son partnerships in which the father is (still) the only owner of the land and the buildings.

It may be interesting for a farmer to register data on the landowners and/or tenants. HANNIBAL has only a possibility to record the data on the area rented and the area rented out. Data of the landowners and tenants cannot be kept, which is in line

with the lack of data on vendors. RED WING and RICARDO do not have such farmer-oriented screens at all.

	Hannibal -Germany	Red Wing -USA	Ricardo -NL
Systems provides for:			
Cash accounting	yes	yes	yes
Accrual accounting	yes	yes	yes
Single-entry accounting	yes	yes	yes
Double-entry accounting	yes	yes	yes
Saving and not destroying of individual transactions after posting (for later analysis)	yes	yes	yes
System allows for:			
Choice of calender year or crop year	yes	yes	yes
Combination of both years	no	yes	yes
Separation of business and personal transactions and reports	no	yes	yes
Multiple operators (partnership)	yes	yes	yes
Multiple landowners / tenants	no	no	no
Multiple profit centres	yes	yes	yes
Entries are in quantities as well as in values	yes	yes	yes

Figure 4.1 Type of accounting

Another important option in farming is the possibility to allocate costs and output to profit centres. All three accounting packages have that option, which makes it possible for a farmer to allocate e.g. fertilizer cost to winter wheat, sugarbeet or grassland. RED WING has an interesting feature with respect to allocating cost to profit centres. It is the so called "auto split": if costs are entered on an account without an allocation to a profit centre, then the program automatically splits the costs among the different profit centres by making different entries based on a percentage distribution entered by the user in the set-up procedure for the chart of accounts (manual: 7-4). RICARDO is more focused on operational control and therefor lacks extensive support on (the allocation of) fixed costs.

4.3 Values and quantities

If the information of an accounting system is to be used in farm management, it is important that entries are in values as well as in quantities. Most farmers are not only price-takers in the economic sense, but they also face output prices set by the government. Marketing is therefore not an important area of decision making and in most of their production decisions farmers tend to be quantity-oriented. Registration of quantities also makes it possible to calculate prices per unit which supports farm analyses and planning. All three systems support the recording of quantity information, but this is restricted to one data field per entry. In some cases (like the recording of the output of milk or sugar-beets) one would wish that a sub-menu was available to record all the important data from the invoice on the quantity and quality (e.g. percentage fat, percentage protein, kg of milk, quality index) of the delivery.

In German accounting the data on quantities and values are reported separately. The data on values are used in the normal accounting reports (*"Geldbericht"*), the data on quantities are reported together with data on internal use and home consumption in a report on the flow of goods (*"Naturalbericht"*). In HANNIBAL the data on quantities in financial transactions can be (but not necessarily are) used in the *Naturalbericht*. If these datarecordings are integrated, the use of profit centres in entries becomes very important: if in such a situation a payment of bought gasoline is recorded, one has to enter a cost category ("energy") as well as a profit centre ("machinery costs") to record the payment as well as the use. If the profit centre is comitted, then the entry will be regarded as an increase in the stock of oil and one has to record the use later on in another journal entry (manual, page 86). This system could work well with experienced users. At least for farmers it would be more userfriendly if the system would ask for the choice "used or stock ?". More in general one could question the need for a special report on quantities (the *Naturalbericht*) in stead of integrating the quantity information in the (notes to the) profit and loss account.

The menus in HANNIBAL are fine but the difference between numbers (for the heads of cattle) and weight (in dt. for stocks) as a default for the quantity data is not very logical. Especially not because the difference is used to aggregate assets into cattle (all the accounts with numbers as a default) and in stocks (all accounts with weights as a default). The manual (page 67) states that this means that it is possible to aggregate eggs (which are measured in pieces) under cattle, which does not seem a very satisfactory aggregation.

RED WING is much more practical on this point. For each account the need of quantities can be specified as well as the unit

of measure. Also for profit centres a unit of measure can be defined, which results in the calculation of costs and output per unit of measure (e.g. per ha.)

RICARDO more resembles HANNIBAL than RED WING in this respect: for all transactions the quantity can be entered, but this field is labelled 'number' and the user has to recall by head if he used kilograms or cubic meters. For some accounts this data has to be registered, it can not be skipped. It is the accountant at the moment of installation of the system and not the user who can control that obligation. The menu does not divide amount by quantity in order to check the unit price.

Another type of quantity information are the data on the individual animals. Although HANNIBAL incorporates the data on the individual machinery, there is not such an option for cattle. Births are not recorded individually but in total per month. RICARDO does not support the registration on any individual item, be it machinery or cattle.

In HANNIBAL the inventory of chemicals, fertilizer and feedstuffs is based on normative values that are entered by the user for the closing balance sheet or otherwise the opening balance sheet. The system does not support a calculation on basis of FIFO - first in first out (manual, page 112). In RED WING and RICARDO the user has to make the closing transactions including the values himself.

5. Ease of use

5.1 Chart of accounts

The fact that software makers have to train their unexperienced users in bookkeeping makes high demands upon the ease of use (figure 5.2). All three systems provide a chart of accounts for a typical farm. In the Netherlands and in Germany standard charts of accounts exist, developed and maintained by accountancy organisations or agricultural research institutes. The Dutch label their standard with the acronym GRAS (Poppe, 1991), the Germans have their *Bundes-programm-einheitscode*. There is a striking difference between these two charts of accounts. In the Dutch system accounts have a 4-digit number and are grouped into headings. For instance all numbers starting with a zero or a 3 are accounts for the balance sheet, numbers starting with a 4 are costs, with an 8 output and with a 9 private income and expenses. In addition costs and output can be allocated to a profit centre by entering the code of a profit centre. Figure 5.1 presents an entitytype-relation-diagram for this chart of accounts (see Poppe, 1991 for this type of datamodel).

The German system works quite different. Accounts have a 5-digit number, of which the first 3 are called the code (*"Textschlüsseln"* or text-key) and the last two the accountgroup (*"Kontengruppen"*). Like the Dutch system the accounts are grouped into headings. All numbers starting with a 1 or 2 are assets and liabilities. Numbers starting with a zero are financial accounts and numbers starting with a 3, 4 or 5 are cost accounts. Unlike the Dutch system however, costs of seeds and home produced fodder (barley, silage maize) are missing under these headings. The reason is that the accounts whose number starts with a 6, 7, 8 or 9 are accounts for production activities (e.g. 601 = winter wheat) in stead of accounts for output. The two numbers of the account group added to this code specify if the entry is an output (default) or a cost (e.g. seed or roughage). The codes for the production activities can also be used to allocate costs to profit centres (figure 5.1).

It is difficult to argue which of the two types of accounts is most farmer-friendly. For somebody trained in the Dutch system the German one is at first difficult to understand. It is however not impossible that after a while it works quite efficient, because redundancy in numbers is low.

Even more striking than the differences between the Dutch and German charts of accounts is the fact that in the United States any harmonisation of such matters is lacking. Possibly the comparison of results between farms or the gathering of harmonized data by the USDA is not as high on the agenda as in Europe. It is therefore not strange that RED WING has several worksheets

to support the user in the set up of his own chart of accounts. This chart does not have to be hierarchical (manual: page 4-31), categories (like assets, equity, expenses) of the accounts have to be defined and it is possible to define accounts that are only used as a heading.

In all three packages the account list can be modified to the individual wishes of the farmer, but in RICARDO the possibility is restricted to changing the names of the accounts. The set up of the accounting scheme and and any changes in it have to be done by the farmers accountant who also installs the program. In HANNIBAL and RED WING the accounts can be tied to profit centres. As transaction data do not contain names or codes of vendors in all three programs, they cannot be attached to accounts either.

5.2 Installation

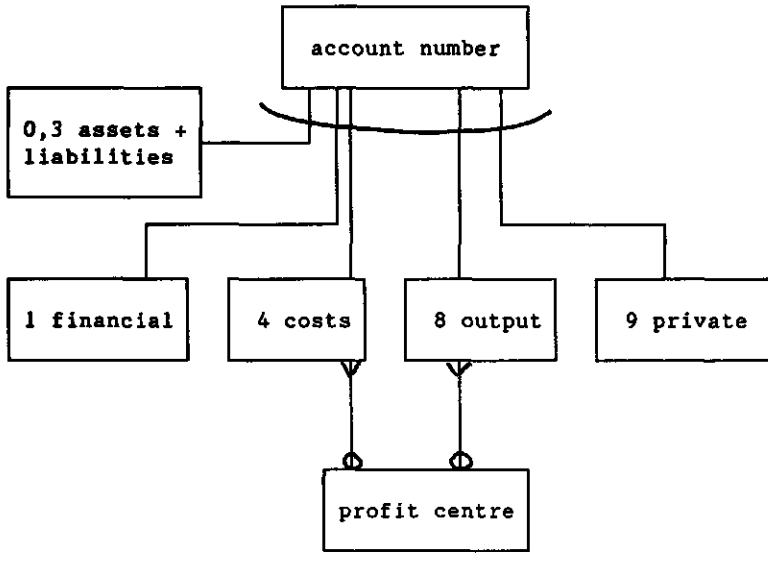
Important aspects of the user-friendliness of a package are the installation procedure and the help functions. Special worksheets to collect installation information (type of accounts, accounting year, farm type) are provided by all three packages. RED WING gives a user more control over the user-interface than HANNIBAL and RICARDO do. In RED WING not only colours can be changed, but also the way defaults and automatic increment of numbers work. The amount of explaining comments on the screen is controlled by an index for the experience of the user. At the highest level questions like "is this entry correct ?" are omitted (manual: page 5-8).

None of the three packages has a procedure to modify the chart of accounts with a worksheet: one could imagine that on the basis of a few questions (e.g. "do you raise cattle") the chart of accounts could be modified on several places before presenting the standard to the farmer. In the concept of RICARDO it is the accountant who does the installation procedure on the farm and fixes these problems. Afterwards the farmer is not allowed to create new accounts or new profit centres.

5.3 Menus

In all three packages menus are used to access different parts. Some parts are nevertheless difficult to locate. In HANNIBAL the menu to enter data on the cropping pattern of the farm has been placed under the heading "closing entries and structural data". From an accountants point of view that is understandable because the data are used to calculate the value of the crops (still) on the field at the closing date. And these calculations are carried out on the basis of normative values in stead of the recorded costs in the enterprise analysis (manual: 101). Data on the number of agricultural work units are entered

An ERD for the Dutch GRAS:



An ERD for the German Bundes-Einheits Programm:

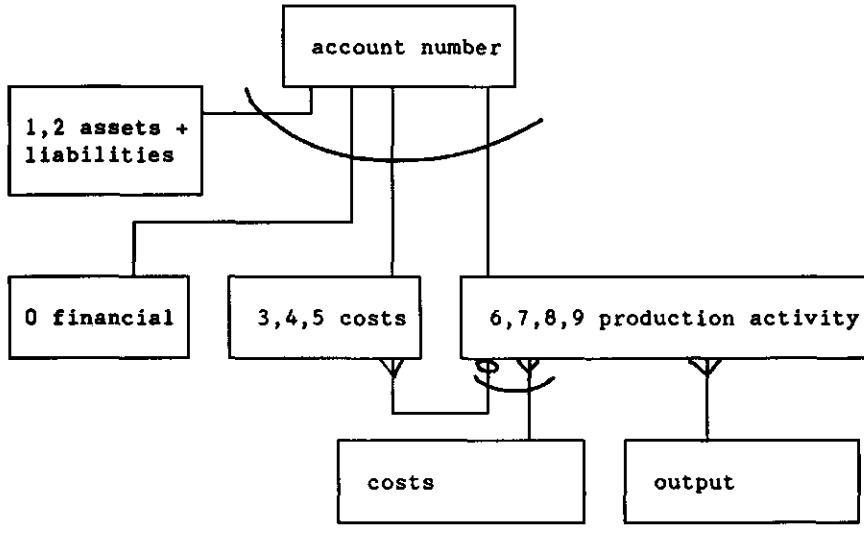


Figure 5.1. The Dutch and German charts of accounts compared by an entity-type-relation-diagram (ERD).

under the same heading. A farmer would not associate these structure data on work units and cropping pattern with closing entries. In most cases it is one of the first things which are known at the beginning of an accounting year. A separate heading in the main menu would therefore be more logical.

The data entry for the very first opening balance in RED WING has been hidden in the menu with the maintenance of the chart of accounts. That is well done. A user uses this menu only once, and at the same time he will tailor his chart of accounts.

RICARDO has a two layer menu to reach all screens: the main menu is displayed on the left half of the opening screen. By walking with the cursor from item to item in that menu, the right half of the screen displays all the options that can be chosen as a second step in that item. This modern looking user interface makes it easy to locate the desired option. This does not release the designer of the screens from the obligation to present a logical structure of the displayed items. Some improvements can be made. An example (from the menus for the accountant who installs the program): the heading "mutation in chart of accounts" is an option of the item in the main menu called "set up of administration" while the resembling "mutation in profit-centres" is presented under "mutation in basic data". And in both cases printing a list of codes is an option of "printing basic data".

More in general this raises the question how packages support the farmer in his struggles to understand the accounting process. Olson (1987:10) states that programmers are striving to avoid the "debit" and "credit" terminology. And in a related discussion Harper (1985) warned for the "stagecoach-effect": we risk the danger not to take full advantage of new database technology by writing programs that simulate the old paper-based accounting process, just as the railway wagons have been designed for 100 years on the basis of the old stagecoaches.

It is hard to compare the three packages on this aspect, but generally speaking, a farmer without any accounting experience would certainly face problems. In HANNIBAL and RED WING it is clear that the menus are very much oriented to the user in an accounting office, as those users are an important part of the customers. RICARDO's philosophy is to avoid any unnecessary accounting terms and screens for the farmer and to highlight the usefulness of financial data for operational and tactical decision making. At some points the influence of the accountants is nevertheless still felt. Terms such as "mutations" (where a farmer would say "change") and "external data" (used for data on the number of cows or ha, which are external to a traditional bookkeeping, but which are certainly not external for a farm) could easily be avoided.

	Hannibal -Germany	Red Wing -USA	Ricardo -NL
Farm chart of accounts is provided	yes	yes	yes
This account list can be modified	yes	yes	yes *)
Accounts can be tied to profit centres	yes	yes	no
Primary vendors can be attached to accounts	no	no	no
Worksheets are provided to collect the installation information	yes	yes	yes
On-line help is available within the program	no	no	yes
Menus are used to access the different parts of the program	yes	yes	yes
Menus can be "skipped" for quick movements	yes	yes	no
An understanding of "debit" and "credit" terminology is required	yes	yes	yes
When entering transactions:			
A transaction can be allocated on the screen in multiple accounts	no	yes	no
The balance of the transaction to be allocated is shown	no	yes	no
The transaction needs to balance before the system allows the user to proceed to the next	no	yes	no
Expenses are entered without a negative sign	yes	yes	yes
Liabilities are entered without a negative sign	yes	yes	yes
A list of accounts can be obtained on the screen	yes	yes	yes
An account can be picked from that list	yes	no	yes
New accounts can be added to the chart of accounts	no	no	yes *)
A list of vendors can be obtained on the screen	no	no	no
Predefined units are displayed after entering the account	no	yes	no
Noncash items are automatically excluded from cashflow	yes	no	yes

Figure 5.2 Ease of use
*) see text for severe restrictions.

5.4 On-line help

On-line help is more or less available in all three programs, but especially in HANNIBAL and RED WING this information is more oriented to the fields that have to be filled in than to the function of the menus. In HANNIBAL the on-line help is even restricted to one screen with the meaning of all the function keys. By using the function key F5 a pull-down menu is activated for consulting different charts with codes or a transaction listing of an account. One of the options of this menu is the screen with the meaning of the function keys. In a special set-up worksheet the meaning of these keys can be changed. Help information on the fields of a screen or the purpose of a menu are not available on line.

Compared to that, RICARDO does an excellent job. In each menu, the help function tells the purpose of the screen. The help menus are context related in most cases. Sometimes however too much help is given: if a user does not use the profit centres, there is no need to provide him with information on that subject when he asks for help when entering transactions.

One of the latest developments in help functions is the use of hypertext, which offers more or less a random structure in help menus: by picking an item from a text information on that concept is offered and so on. None of the packages uses this technique yet.

5.5 Entering data: HANNIBAL

When entering transactions the chart of accounts and other lists of codes can be obtained on the screen. HANNIBAL uses F5 to activate such a pull-down menu. Page-up and Page-down are available in these menus and a displayed code can be chosen with Enter. A code can also be located in such a pull-down menu by entering a number. This assumes that the user at least knows what the first two digits of the code are. The opposite, searching by entering a part of the name of an account (e.g. milk) is however not possible in the German package. The lists that are displayed by F5 are not context dependent. When entering financial transactions one can activate a list of farms with F5 (a function relevant in some menus for accountants with multiple clients), and then copy any farm number to the field 'amount' in the menu for entering financial transactions. Which results of course in pure nonsense.

The menus of the German HANNIBAL are clear: they are reached by choosing them with their number and they provide clear masks with two headlines for the name and number of the menu and the name and accounting year of the farm. When entering the data the date and the number of the document (e.g. the number of the invoice or the report of the bank) are copied automatically to the next entry. Arrow keys are used to skip to the next field and

function keys to skip to the last or the next journal entry. The upper half of the screen is used for a display of the already entered transactions, the lower half for entering a new one. The lay-out is quiet and fine. Separate fields for receipts and expenses are available, so negative signs (which are allowed) have to be used for storno entries only. HANNIBAL shows the balance of the bank account when the data are entered. An "interim balance" is also shown, to facilitate the location of errors: this balance changes when the user turns over the entries (manual: 77). HANNIBAL does not show predefined units after entering the account code, but it jumps to one of the two fields (numbers or tons) which are available for quantity information. This is a typical data base design, with the disadvantage that the user has to remember where he used tons and where 100 kg.

5.6 Entering data: RED WING

RED WING's menus are not as user-friendly although they have some nice features. A typical screen to enter data in RED WING has one headline with the name and number of the menu and one bottom line with the meaning of some function keys. The rest of the screen is divided in three horizontal boxes. The first one on top is the entry box. There the system asks for a particular piece of data, and the response has to be typed there. The middle box displays the data that has been entered, as well as some information of low interest, like the amount of space available on the disk for more transactions. The third box displays context related help-messages. There are some disadvantages in this lay-out. Full screen editing is not available. In worksheets the line numbers have to be entered before options can be changed. Earlier transactions however can be reached with the arrow function keys. RED WING has no possibility to activate the chart of accounts in a pull down menu (like HANNIBAL and RICARDO do) at the moment of entering the data. But when a wrong number is entered, the system displays 9 existing numbers in the neighbourhood of the non-existing one and by entering an F (Forward) or B (Backward) other numbers are shown. These numbers can not be picked from the displayed list by a movement of the cursor. When an account code is entered, the systems displays not only the name (like HANNIBAL), but the default for debit or credit and -if applied- the unit of measure for quantities as well. When entered transactions are displayed however, the name of the account and the unit of measure have to be guessed. The screen does not show them any more.

At the moment transactions are entered, the date of the last transaction is the default value. It is possible to increment the document number automatically (manual: 5-15). The system automatically assumes one or two new figures for the date to be a day in the same month and year as in the last entry (manual: 10-8).

But the accounting year is not automatically taken as a default for the crop year. A default value for the amount is based on an offsetting running total of earlier entries with the same document number.

In RED WING the total journal entry has to be entered. The system counts a running total of the debit and credit entries and function key F3 can be used to make an offsetting entry for the checking account (manual: page 3-15). It is not possible to check the running total of the checking account itself at that moment in that screen, but in the American system of entering payments that makes perhaps also less sense.

5.7 Entering data: RICARDO

RICARDO resembles HANNIBAL more then it does RED WING. A pull down menu can be activated, showing the chart of accounts. It is also possible to get a display in various steps. The first menu then asks for a choice between accounts from the balance sheet, output, direct costs, fixed costs, financial results and extraordinary items. After a choice is made (e.g. fixed costs) an additional box shows groups of accounts like labour, machinery, overhead costs etcetera. This window approach leads the user to the account he searches. At the most detailed level additional help on the definition of the account is available. This concept is very friendly for users who have no experience in coding financial transactions. Nevertheless, a user has to know that personal transactions can be reached under the heading balance sheet in the first help menu. From an accountants point of view this is logical: a personal transaction is a withdrawal of capital. For a novice in accounting it would be more logical to have seperate headings on personal income and personal spending. A second remark concerns the accounts that are displayed in the help menu. These are not context-related. So it is possible to pick a non-cashflow account for e.g. private consumption of products (output) when entering data on payments.

Like HANNIBAL, RICARDO has a facility to search for errors in entering amounts by calculating an interim balance. It is even more flexible because the user can define very easily a continuous list of transactions for which the program calculates the total outflow and inflow of payments.

More support of the farmer in his struggle with accountancy could be given by changing the sequence which is used for the different fields. The program asks first for the profit centre, next for the account code and then for the amount. A defence could be that the account code can provide a default value for the kind of amount (payment or receipt) but that trick has not been implemented. It looks far more logical to use a sequence like HANNIBAL does: amount, account code and profit centre. First of all this is the way the farmer thinks: he reads and directly

enters an amount of money and then has to provide the answers on the questions for the type of payment (account) and the business or person for which the payment was made (profit centre). In the RICARDO sequence he reads the amount, has to dream up and enter the answers, and then has to enter the amount, which he hopefully has not yet forgotten. A second, perhaps even more important, point against this sequence is the denial of the relationship between profit centre and account. In most cases (e.g. costs and output) an account will have only one profit centre (or at least the choice will be smaller). By entering the account code, the profit centre is therefore implicitly known and can be displayed. In the current lay out of the menu the farmer has to enter a profit centre for all entries, which is not necessary.

A related question concerns the interpreting of the concept "profit centre". Especially in RICARDO and in RED WING this can be used for true profit centres within the business (like different crops, raising cattle etcetera) and for allocating payments to members of a partnership. From the point of view of a traditional chart of accounts, this can be defended. But for a user it is perhaps easier to split this concept into two layers with their own codes. The first one would be for the distinction between the assets, liabilities, income and spending of the different families (of the three partners), of the private business of the partners (e.g. having land that is rented to the partnership), and of the business(es) of the partnership. The second one would be used for 'true' profit centres within the business or to identify family members within an entry for family income (e.g. to allocate income from labour or a study grant to one of the family members). Partnerships would need the first code, without necessarily using the second one and single-operator farms could be interested to have the second one. The greatest advantage for the separation could be with farmers who use both, because the consequences of a partnership and the concept of profit centres are not confused.

5.8 Multiple accounts

The programs do not support the allocation of transactions in multiple accounts and to multiple profit centres very well. Ideal could be the following procedure in which all information is registered: each payment is recorded for the total amount of money which is paid. This is done in the menu where cash receipts and cash disbursements are recorded. When a payment has to be split into two accounts (e.g. a payment for concentrates and for fertilizer on one invoice of a cooperative) a function key is used to activate an additional menu in which the split is recorded. Of course this split has to balance with the original payment. The display in the first menu would afterwards show that one payment has been made, which has been allocated in multiple

accounts. In the same way a third menu could be activated at this moment or later, for allocating the amount to multiple profit centres (e.g. fertilizer for wheat and for sugarbeet).

This situation has unfortunately not been found in any of the three programs. In HANNIBAL and RICARDO the connection between the amount of money that has been paid and the journal entries in the menu for cash payments is lost because each entry can handle only one account. In HANNIBAL it is also impossible to record the number of the transaction from the document of the bank.

The allocation to profit centres shares this critique. RED WING is doing a better job here, not so much as a result of an excellent design with additional menus, but because journal entries can contain multiple lines. That means that one payment can be split in to several journal entries with one offsetting entry on the checking account.

HANNIBAL and RICARDO also have no options to allocate fixed costs with a cost-allocation base (e.g. percentage of output or percentage of direct costs) to profit centres. From a theoretical point of view such an option could be debated, but most farmers like the possibility to allocate all costs and to calculate cost-prices. RED WING does not support such a cost base either, but has at least a possibility to allocate any type of cost with a fixed percentage to a profit centre.

HANNIBAL has an interesting method for the opening of a new accounting year. The closing balance has to be explicitly transferred to the opening balance of the next year. This procedure can however be repeated more than once. That means that entries in a new year can be made without closing the old one. After closing the definite closing balance can be used as the opening balance of the next year (manual: 127).

RED WING and RICARDO are less flexible here. The end-of-year procedure in RED WING has several steps and leads to creation and erasing of files (manual: 12-3). RICARDO has quite another philosophy on the opening of a new accounting year, due to the relationship between user and accountant: the opening balance of the new year has to be entered explicitely and can not be copied from the closing balance because normally the accountant would have made corrections and closing journal entries after the moment the farmers closed his old year.

RED WING has some problems in creating a real cashflow statement. The cashflow statement contains non-cash items such as depreciation (manual: page 11-58). The "solution" is that the system provides some extra lines that can be used for "adjustments" by the user e.g. for entering "negative" depreciation.

6. Error correction

Notwithstanding all the help provided in a system, especially unexperienced farmers will make mistakes when they enter data. Procedures for error correction, and their user-friendliness are therefore important. Figure 6.1 contains Olson's list to review the three programs.

	Hannibal -Germany	Red Wing -USA	Ricardo -NL
Full screen editing is used	yes	no	yes
The user is asked to verify entry correctness before continuing	no	no	no
Errors can be corrected directly even after being written into the disk file	yes	yes	yes
Offsetting entries for errors are needed only after posting or closing	yes	yes	yes
Entries can not be deleted once written into disk file	no	yes	yes
A list of error codes, what they mean and how to recover is provided	no	yes	no

Figure 6.1 Error correction

In the previous section we already described how HANNIBAL uses the arrow keys and function keys for full screen editing. Function keys F1 and F3 are used to jump to the last or the next entry. A menu in HANNIBAL can not be left without posting the entries. RICARDO is not very different in these aspects of editing.

7. Menus and records

In paragraph 4 the three systems have been reviewed on their type of accounting and the detail of the general ledger. Here we focus in more detail on the accounting options that are provided by the programs in their menus and records. This review however is hampered by two facts. First of all RED WING is "only" a general ledger, and specific integrated programs are available for payroll, accounts payable, accounts receivable and asset depreciation. Second there are important differences between Germany, the Netherlands and the United States in their national banking systems. In the Netherlands and Germany farmers have a checking account with a bank. Nearly all business payments are done through such an account: after receiving an invoice the farmer writes a payment order (with the amount and the number of the bank account to which the money has to be transferred) and sends it to his bank, which takes care of the transfer itself. Every week a farmer receives a document with all the executed payment orders and all the money he has received on his bank account. This document is used for making the entries in his accounting system. In future on more and more farms this process of sending payment orders from and receiving documents from the bank will be done by electronic mail 1). As an interim solution in the Netherlands, accounting offices and farmers can get the documents from the bank on tape or diskette. That makes entry of the data on payments and receipts redundant and some automatic coding (based on the bank-account of the vendor, attached to an account, e.g. cost of electricity) possible. This method is attractive for accountants because the cooperative RABO-bank has a market share of more than 90%.

The payment system in the United States is quite different and resembles much more the process of recording cash transfers. There the farmer hands over a check to a vendor, or receives a check. These checks are then sent to a bank, which also returns a document with the transactions and the proceeded checks.

Figure 7.1 shows the different menus and records that are available in the programs. In the European system of transferring money, it is logical to enter the data of receipts and payments in the same menu. The data are taken from the same document and the running total of the bank account can be shown to improve accuracy. HANNIBAL and RICARDO have such a menu. In the American situation some farmers enter their checks immediately and not on the basis of the document with the transactions from the bank. Then two separate menus for receipts and disbursements can make sense, also because the system automatically knows from the menu if the transaction is debit or credit. So, the RED WING menu is more logical than a European user would think at first sight.

1) The latest release of Ricardo supports electronic banking.

An interesting option in RED WING is the possibility to record transactions as "recurring transactions". This option can be used to create a batch of coded transactions, with or without fixed amounts, which can be activated as often as one likes. This is useful for repeating transactions such as monthly repayments on a loan, monthly depreciation or a quarterly entry on household consumption (manual 9-2, 9-8).

	Hannibal -Germany	Red Wing -USA	Ricardo -NL
Cash receipts and disbursements combined	yes	no	yes
Check writing option	no	no	no
Accounts receivable	no	*)	no
Accounts payable	no	*)	no
Recurring transactions	no	yes	no
Loan accounts	no	no	no
Payroll	no	*)	no
Capital asset depreciation:	yes	*)	no
- historical cost	yes		
- market value	yes		
Cropping pattern and other farm data	yes	no	yes
Miscellaneous journal entries	yes	yes	yes
Value added tax	yes	no	yes

Figure 7.1 Menus and records
*) Red Wing sells packages for accounts payable, accounts receivable, business inventory, payroll, asset depreciation and project cost that work integrated with the general ledger

Capital asset depreciation for tax purposes is nearly always based on historical cost. That information can however be misleading for management purposes as it does not reflect the fair value of the assets and wrongly suggests that fully depreciated machinery can be replaced profitable. Olson (1987: 13) states correctly "to have complete information, both methods are needed".

HANNIBAL has a fine method of recording data on machinery and other assets. A special menu contains all data on assets, like the historical value, the depreciation methods for fiscal and economic depreciation. The menu however can only be activated from the main menu and not on the moment that a financial entry is made on the buying or selling of an asset. Fiscal values are the default for the market values, that can be changed after-

wards. Special depreciation is possible. It is not possible to revalue all assets (or different types of assets) with a same percentage to reflect rising market values. In other words: the possibility to enter market values is no guarantee that current cost accounting as an alternative method of preparing the profit and loss account is available.

Technical data on the farm are of course important for a farm accounting system. It helps the farmer to interpret results and connect the financial flows with the decisions that have to be made. Some remarks on the recording of the cropping pattern and the changes in the livestock in HANNIBAL have been made in the previous sections.

In RICARDO, technical data can be entered in a special menu for so called "external data". The user can define all kinds of technical and economic indicators. In functionality this resembles a spreadsheet for calculating indicators by combining data from the accounting system and technical data. The user gets customised screens on his farm. Therefore the user is not confronted with a spreadsheet, but at the moment of installation the accountant uses a module to build formulas that calculate indicators and combine those indicators in user defined outlines. It is in this aspect that RICARDO fulfils its promise to support monthly and daily decisions on the farm. Together with their accountant, farmers can define several types of tailored reports with technical and accounting data to support their decisions. It has however to be seen to which extent they like this approach, including intensive contacts with their accountant; it is not unthinkable that experienced computer users would prefer an integration with their favourite spreadsheet.

Miscellaneous journal entries are important for recording household consumption, internal farm use and special depreciation. HANNIBAL works with special screens for each of these types of entries. RED WING and RICARDO provide a screen for miscellaneous journal entries to record these data. That is more difficult for unexperienced farmers, but gives more possibilities for experienced ones. And in RED WING the option of recurring transactions is helpful here.

8. Reports

As programs differ in their options and the data that is recorded, they will also differ in the reports that are available as output for a user (figure 8.1).

A transaction listing by account (*"grootboekkaartje"*) is in HANNIBAL already available at the moment the data are recorded by using function key F5. In the case of assets the screen lacks clarity (manual: 63). It would have been better to list the assets with their value, putting the data on the depreciation method in a separate screen. RED WING and RICARDO do not have such facilities at the moment of recording.

The lay-out of the reports is very much influenced by national habits. In Germany, farmers are used to receive from their accountant a lot of paper in return for their fee. A typical annual account *("Jahresabschluss")* contains not only a profit- and loss account, a balance sheet and a statement with the changes in net worth, but also a lot of detailed data on all the individual assets, all financial accounts (opening values, changes during the year and closing values) and all the individual accounts in the profit- and loss account. A special German feature is the "volume report" (*"Naturalbericht"*), in which the opening value (in kg or numbers), the increase, the decrease and the closing value of several accounts (livestock, inputs, products) is given in volumes. Thus, a German accounting report contains all the details which have been used to calculate the profit and the net worth of the farm. The advantage is of course that all possible detail is available for a decision maker. The question remains if he is prepared to go into all the details.

The Dutch in contrast put more emphasis on the conclusions (the profit and the net worth itself) in their accounting reports, and use the details for writing a commentary and clarifying footnotes.

The content and the lay-out of a report is sometimes also dependent on national habits. In the United States a profit- and loss account, like the example given by Boehlje and Eidman (1984) shows a farmer the accounting process by starting with the cash operating income and showing the inventory adjustment, the capital asset adjustments, other non-cash transactions and ending with an income statement and the addition to retained earnings. The advantage over the European lay-out, in which only the inputs and outputs are shown, is that a farmer directly understands the nature of the accounting process. A disadvantage is that total costs for e.g. machinery are unrecognisable, as they are split in a cash element and depreciation.

It is therefore not a surprise that the reports generated by the three programs show huge differences. This is especially true for the profit- and loss statement and the income statement, although HANNIBAL shows elements of cash operating, depreciation and household consumption in its profit and loss account. RED WING does not use the Boehlje and Eidman format exactly, which is perhaps due to the used chart of accounts. In RED WING profit and loss account is a synonym of income statement. The user can change the terms in a set up menu.

Differences in the balance sheet are smaller, most of them using short, intermediate and long term categories and abandoning the traditional format with assets on the right, and liabilities on the left hand side. HANNIBAL adds a percentage column to the balance sheet, similar to RED WING's percentages in the income statement, as well as details on the acquisition value and the increase and decrease of assets. There is no split between a business and a personal balance sheet, but some personal items, like the farm house, are mentioned separately among the assets.

The aim of accounting is an analysis of the farm, locating strong and weak points in order to support decision making. Business analyses and enterprise analysis are therefore important. HANNIBAL however does not calculate any ratio's or statistics. Trend analysis on subsequent years isn't available either.

Enterprise analysis is supported quite well by HANNIBAL. Gross margins are calculated, on total enterprise basis and on per unit basis. Although overhead costs in general cannot be allocated, it is possible to incorporate an amount of machinery cost per enterprise. The reports then excellently show results per enterprise, and also on machinery cost (total costs minus allocated costs), other fixed costs and on non-allocated direct costs. There is only one level of enterprise coding available, which is perhaps too little for large operations, that would like to define enterprises like wheat (level 1) on the Smith farm (level 2). RED WING uses a slightly different format when reporting on enterprises, but is earns the same credits. Some remarks on the method used by RICARDO to calculate and present technical economic indicators have been made in the previous section.

It can be worthwhile to compare figures of the farm with external data. HANNIBAL has an option to enter such external data (*"Vergleichszahlen"*) for all accounts and for all months (manual: 142). One could imagine that this option could also be used to record budgeted data instead of external data. The manual however does not make that suggestion. RED WING devotes much more space to maintaining budget information. There are several methods to enter budget amounts. Besides entering the data for each account manually for each month, it is also possible to (1) copy the data on the first month to all successive months, (2) apply this method while changing the amounts with a percentage or (3) a

	Hannibal -Germany	Red Wing -USA	Ricardo -NL
Transaction listing by account	yes	yes	yes
Monthly journal listing	yes	yes	yes
Actual cash flow statement	yes	yes	yes
Farm profit and loss statement	yes	yes	yes
And/or Income statement	yes	yes	yes
Balance sheet/Net worth statement	yes	yes	yes
- assets by short/intermediate and long term categories	yes	yes	yes
- liabilities by short/intermediate and long term categories	yes	yes	yes
- traditional format with assets on the right side	no	no	no
- separate columns available for different valuation methods	no	no	no
- can footnotes on valuations be included	no	no	no
- can contingent liabilities be added when market-value approach is used	no	no	no
- are business and personal items Separated	no	yes	yes
Statement of changes in net worth	yes	yes	no
Business analyses			
- profitability measures	no	yes	no
- solvency measures	no	yes	no
- liquidity measures	no	yes	no
- trend analysis for subsequent years	no	yes	no
- monthly/quarterly analysis	no	yes	yes
Enterprise analysis			
- two levels of enterprise coding	no	no	no
- cash income and expenses can be allocated directly	yes	yes	yes
- overhead expenses can be allocated	no	yes	no
- footnotes can be stored to explain allocations	yes	no	no
- adjust for inventory changes	yes	yes	yes
- enterprise reports contain:			
- gross margins	yes	no	yes
- cash flow statement	no	no	yes
- net worth statement	no	yes	no
- on total enterprise basis	yes	yes	yes
- on per unit basis	yes	yes	yes
Data can be compared with budgets	yes	yes	yes

Figure 8.1 Reports

dollar amount, (4) change an existing budget with a certain percentage (manual 8-4). Other methods would be to use the actual or budgeted amounts of last year, and increase them with a certain percentage for inflation. This method is not supported. Several reports are available in RED WING to show budgeted profit- and loss accounts, to compare them with actual data or to show combinations of actual (for the first months) and budgeted (for coming months) data. The last mentioned option is very attractive from the tax planning point of view because it can be used to estimate fiscal profits at any point in time with the highest possible reliability. Using recurring transactions for posting monthly depreciation is then a prerequisite.

RICARDO does not have much possibilities to enter data from outside the farm for external comparisons, although in theory the method to calculate technical economic indicators could perhaps be applied as such. Planning is supported by the package. It provides a menu to register all journal entries that have a planning character. The advanced methods of RED WING to calculate budgets are however not supported. Comparison between budgets and actual results is done in the technical economic reports.

Some general remarks on the lay-out of the reports also have to be made. In HANNIBAL it is very unfriendly for a user that the headings of the columns in a table of a report disappear from the screen when lines are scrolled downwards. A function comparable to a "titles"-command in a spreadsheet would solve this problem. Some screens in HANNIBAL (like the changes in net worth) make a very busy impression, mainly because a lot of lines are used that turn the screen into boxes. Experts like Tufte (1983) argue against such an approach.

RED WING has some unfriendly characteristics too. In menus with reports it uses eight lines of the screen for titles that contain relatively little information. As a result a clear view in one screen on the total balance sheet or profit and loss account is lacking. In reports where data on the last five years are given, a printer is necessary because the screen gives only the left or (in the next screen) right part of the display. In these parts data from the balance sheet are given very exactly with two dollar cents behind the decimal point. One would wish that the programmer would have had the clever idea of rounding the amounts to the nearest 100 or 1000 dollar and display 5 years in one screen.

When analyzing results in for instance the profit and loss statement it can be useful to look at the transaction listing of an individual account. In HANNIBAL this is possible by using the function key F5 and specifying an account code. Even more friendly would be the use of the arrow keys to locate a line from the statement under review, in combination with the enter or a function key.

9. Concluding remarks

This paper shows that accounting programs can be compared with the help of an evaluation form like the one developed by Olson (1987). Nevertheless it would be hard to rank the three evaluated packages, as differences in farm accounting between countries as well as differences in the user's criteria influence such a ranking. It would also be not very informative for potential users, to check if a program is totally in line with a reference information model like the models developed in the Netherlands (Poppe, 1991).

The main differences between the three packages are summed up in figure 9.1. It suggests what the perfect accounting package from a farmers point of view could be: taking the best from each

	Strong points	Weak points
HANNIBAL	* very complete system * clear menus and screens * oriented to farming	* analysis can be improved * accounting oriented * little help in program and manual for farmers without experience in accounting
RED WING	* excellent manual also for accounting novices * strong support of profit centres * reports support planning and analysis	* not oriented to farmers * screens and use of pull down menus can be improved * national chart of accounts for comparison is not available
RICARDO	* tries to support farmers decisions * excellent help menus and nice window-look * oriented to accounting novices	* oriented to the registration of cashflow, output and direct costs * screens for analysis and planning can be improved

Figure 9.1 Differences between the three packages, expressed as strong and weak points from a farmers point of view

system the perfect package would be created with RICARDO's philosophy in mind to support the farmer who is an accounting novice. It would nevertheless have the complete accounting procedures in common with HANNIBAL and resemble RICARDO in its on-line help and its use of windows. It would support planning and allocation of costs to profit centres like RED WING does. And its manual would have RED WINGs clarity, help the unexperienced farmer like RICARDO does and describe all the different menus like the manuals of HANNIBAL and RED WING.

This paper also shows that differences between accounting packages can be big. One may wonder why. First reason is that banking and accounting practices differ between countries. These differences are clearly reflected in the programs, especially in the data entry of payments, the chart of accounts and in the format of the reports. A second reason is the influence of the marketing policy for the product. The decision to make a program particularly for the farm sector (RICARDO and HANNIBAL) or for small businesses in general (RED WING) has an impact on the program. The same is true for the decision to support the use in the accounting office (HANNIBAL) or only on the farm (RICARDO).

Comparing RICARDO and HANNIBAL also indicates that the accounting organisations'view upon the structure of its future relationship with the farmer, where the farmer starts to do some but not all of the accounting proces, has an impact on the packages.

This paper leaves the question open if and how these choices by software makers can be explained. The induced innovation theory (Hayami and Ruttan, 1985) suggests that innovations (like software programs) can be explained by the relative scarcity of production factors. Relatively high prices (as a measure for scarcity) will induce a quest for improved technology that replaces the scarce production factor by a more abundant one.

It would be interesting to know if prices for sharing the bookkeeping out with an accountant are relatively high in the USA and Germany, compared to the relatively light fiscal obligations for farm accounting. In that case a do-it-yourself-approach by a farmer with the help of a program can be attractive. Substitution and institutional factors can also be at work. In the Netherlands, several services for enterprise accounting at gross margin level are available, on PC as well as in central batch service. As these services are inexpensive and successful, farm accounting faces probably more competition than in the USA and Germany.

An institutional factor related to the Netherlands is the national INSP-plan to promote the use of information technology (Poppe, 1991). As this plan lowers the costs for software makers by providing know-how without a charge, it is not inconceivable that this supported especially small firms and that it put the industry in a waiting mode until results would be available.

For the further development of agricultural software it would be interesting to have a clear view on these underlying factors that shape the products and the industry. If such factors are not strongly at work, the differences between the programs suggest that more international cooperation may be attractive.

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Annex 1 Differences in criteria with respect to Olson's form

Figure 2.1 General information:

Questions on addresses of companies and vendors, on the reliability (number of years in business, distance to buyer and amount of backup support and initial training) have been omitted. Questions on the type of vendors and the type of users have been added. A question on support of colour-screens (EGA, Hercules) was also added.

Figure 3.1 Instructions in manual and system

Questions that verify the spelling and grammar of the manual or that check if the manual correctly describes what happens in the programm have been omitted.

Figure 4.1 Type of accounting

A question on quantities has been added here, and deleted in Olsons section on accounting features

Figure 5.2 Ease of use

A question on the possibility of alphanumeric codes has been omitted as well as a question on the availability of a seperate program map in addition to the manual. Questions on the picking of accounts from a displayed list and on the adding of accounts to the chart of accounts at the moment of entering have been added. A question on the predefined units for accounts has also been added and the question on automatic exclusion of noncash items from a cashflow statement has been moved from Olson's required accounting features to ease of use.

Figure 6.1 Menus and records

Some of the items listed here (a.o. on accounts receivable and other records) were listed by Olson under "desired accounting features". A few of these "desired features" have been omitted because the are too much oriented to the American tax system or American agricultural policy (like C.C.C. sales). Others (on V.A.T. and on the cropping pattern of the farm) have been added.

Figure 7.1 Reports

Questions on the possibilities to transfer data (especially from cash flow statements) to spreadsheets and ASCII files have been deleted. A question on the possibility to compare with budgets has been added.

The rating method proposed by Olson to arrive at one statistic for each package has not been applied here.