Ice Calculator and Trial Management System

User Manual

Contents

Further Help

For further information on this or other available software tools please contact:

Mike Dillon Associates Ltd.
32a Hainton Avenue
Grimsby
North East Lincolnshire
DN32 9BB
United Kingdom

Phone/Fax +44 (0) 1472 348852
Fax +44 (0) 1472 356838
Email: Software@mdassoc.demon.co.uk

Notes

0.0 Introduction

0.1 Who is the software aimed at?

Although initially developed for the African fishing industry, this software could be used by anyone who has an interest in investigating the economic impact on key stakeholders in the fishery industry. The software looks at this by considering the use of different types of ice and insulated containers.

0.2 What can the software do?

Most importantly, the software is designed to make cost predictions for using different amounts of ice and types of containers. This is achieved by:

1) A Trial Management System capable of gathering and reporting the results of experimental trials using different types of ice and containers.

2) Recording of Ice Melting Rate Trials for containers, including their description, dimensions and construction.

3) An Ice Calculator which is able to model many different factors, such as type of fish, temperature, use of different containers, types of ice and journey conditions. It can then be used to predict the quantity of ice needed to maintain quality.

Using all parts of the program, it is possible to compare the experimental melting rates recorded from the trials with the theoretical melting rates calculated by the software.

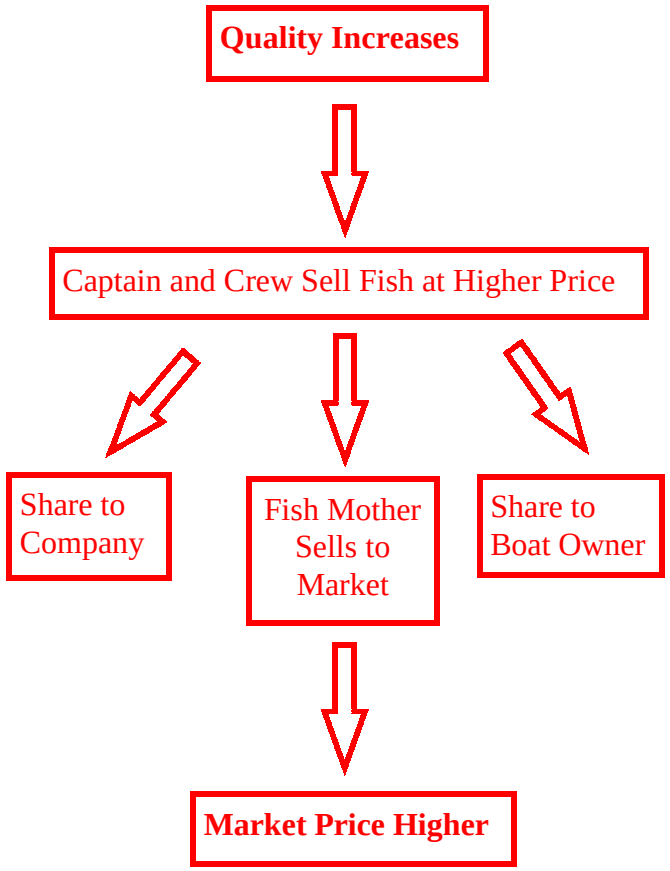
It is also possible to design and test different insulated containers without the need to physically construct them.

0.3 How is the software used?

The rest of this manual explains how to use the software.

0.4 Example of Benefits

When icing improves the quality of fish, the market price increases. This leads to increased income for all of the stakeholders.
The diagram below represents the situation in Ghana.



7.0 Training Manual

The Ice Calculation Training Manual is a commentary and exposition of the physical basis of the ice calculation.

Topics covered include:

Heat changes on cooling fish.
Heat transfer and the maintenance of temperature.
Ice melting rates in fish boxes.
Theoretical and empirical values.
Parameters t and tmax.
Optimum ice loads
Ice losses
Fish:ice ratio and threshold values
Sub-optimal ice loading.

6.1 Reports Menu

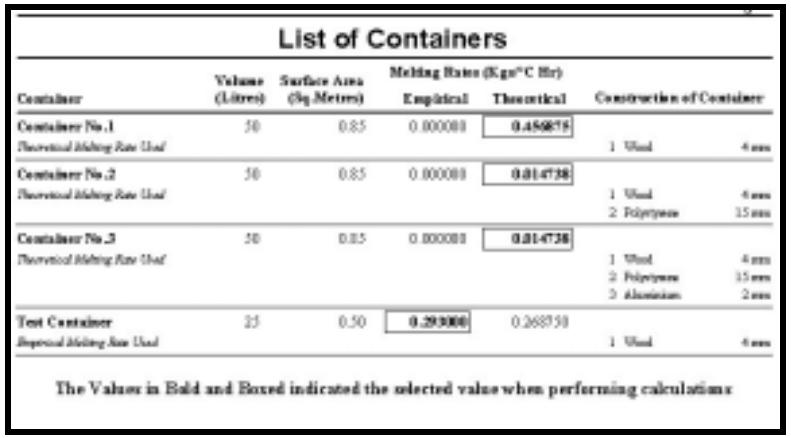
Icing Trials Report - All Information

Details

Journey Details

Quality - Organoleptics

The Trial Information report gives all details of the selected trials including journey maps, quality test results and costs.



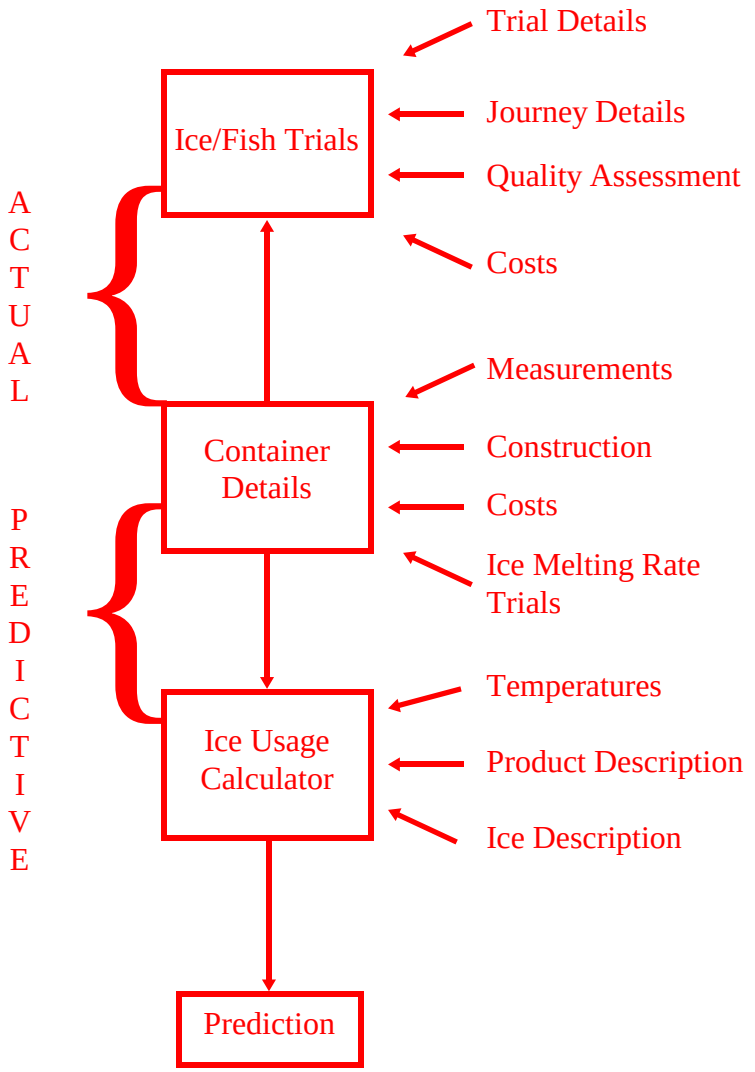
List of Containers

Container	Volume (Litres)	Surface Area (Sq Metres)	Melting Rates (Kgs°C Hr) Empirical	Theoretical	Construction of Container
Container No.1	50	0.85	0.000081	**0.456875**	1 Wood 4 mm
Container No.2	50	0.85	0.000081	**0.014738**	1 Wood 4 mm 2 Polystyrene 15 mm
Container No.3	50	0.85	0.000081	**0.014738**	1 Wood 4 mm 2 Polystyrene 15 mm 3 Aluminium 2 mm
Test Container	25	0.50	**0.293006**	0.268750	1 Wood 4 mm

The Values in Bold and Boxed indicated the selected value when performing calculations

The Containers report gives volume, melting rate and insulation information for all containers.

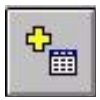
0.5 Program Overview



1.1 Navigation

Whilst using the software, these are some of the buttons and features you will come across.

Back to the previous screen



Add a new record

Delete the selected record

Go to the Maintenance Menu

View and print options

6.1 Reports Menu

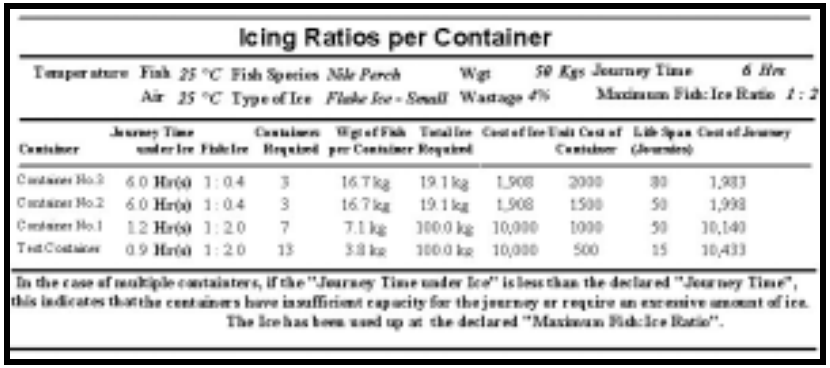
From the Main Menu click on the Reports Menu button.

This gives access to two kinds of Report
1) Trial Information
2) Container Details

Use these buttons to select or de-select all of the trials listed.

3) Double click on a single trial to include it in a report. Double clicking on a trial that is currently included will de-select it.

5.1 Ice Calculations



Icing Ratios per Container

Temperature Fish 25 °C Fish Species *Nile Perch* Wgt *50 Kgs* Journey Time *6 Hrs*
Air *25 °C* Type of Ice *Flake Ice - Small* Wastage *4%* Maximum Fish:Ice Ratio *1 : 2*

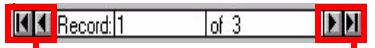
Container	Journey Time under Ice	Fish:Ice	Containers Required	Wgt of Fish per Container	Total Ice Required	Cost of Ice	Unit Cost of Container	Life Span (Journies)	Cost of Journey
Container No.3	6.0 Hr(s)	1 : 0.4	3	16.7 kg	19.1 kg	1,908	2000	80	1,983
Container No.2	6.0 Hr(s)	1 : 0.4	3	16.7 kg	19.1 kg	1,908	1500	50	1,998
Container No.1	1.2 Hr(s)	1 : 2.0	7	7.1 kg	100.0 kg	10,000	1000	50	10,140
Test Container	0.9 Hr(s)	1 : 2.0	13	3.8 kg	100.0 kg	10,000	500	15	10,433

In the case of multiple containers, if the "Journey Time under Ice" is less than the declared "Journey Time", this indicates that the containers have insufficient capacity for the journey or require an excessive amount of ice. The Ice has been used up at the declared "Maximum Fish:Ice Ratio".

This then gives a report which lists suitable containers for the journey, and the amount of ice they should require. It also shows the number of containers needed and how much fish should be put into each one

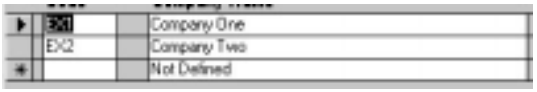
1.1 Navigation

Scroll up or down text



Go to first or previous

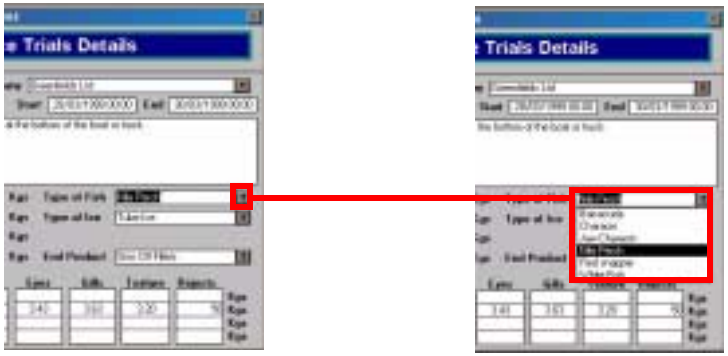
Go to next or last



Selected record (arrow head)
New Record (star)

To delete a row, click on the arrow head and press delete on the keyboard.

Drop-down menu selection

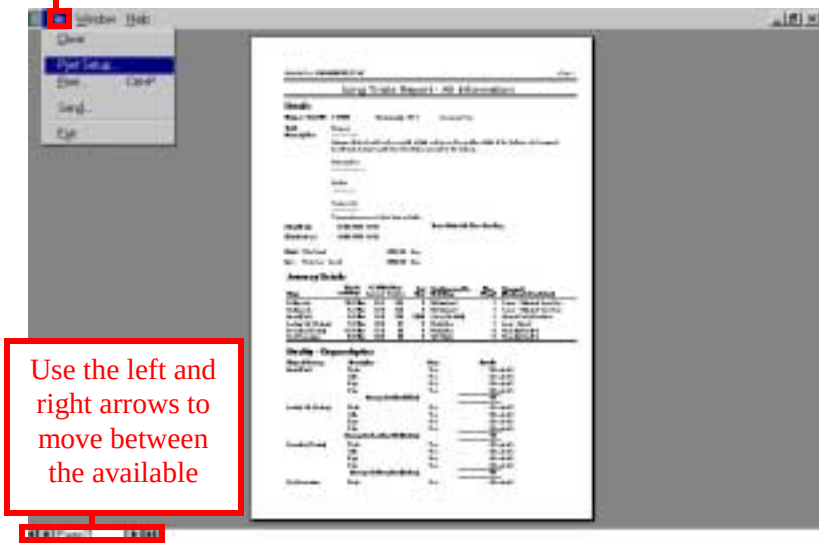


An alternative to ‘point and click’ with the mouse is to use the keyboard ‘tab’ key to move between fields.

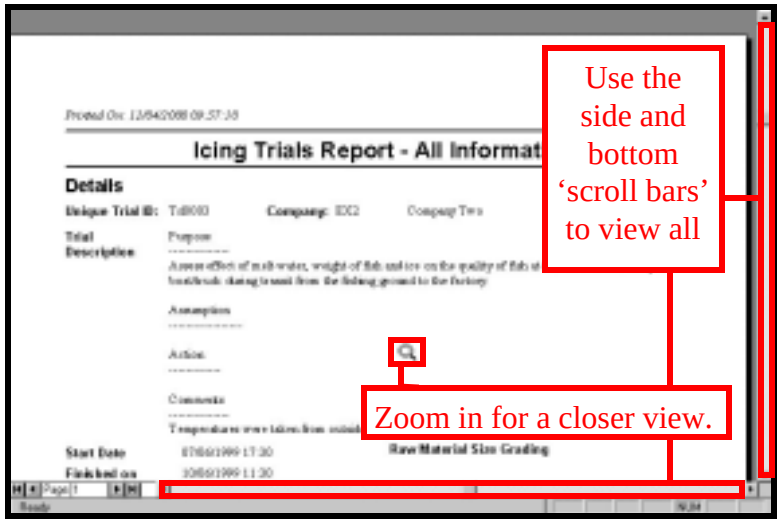
1.2 Viewing and printing

Whenever the ‘print preview’ button is available on a menu you can view and print report(s) .

Drop-down menu: Click file then close to return to the previous menu. Click file then print to print the report you are viewing.



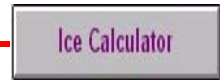
Use the left and right arrows to move between the available



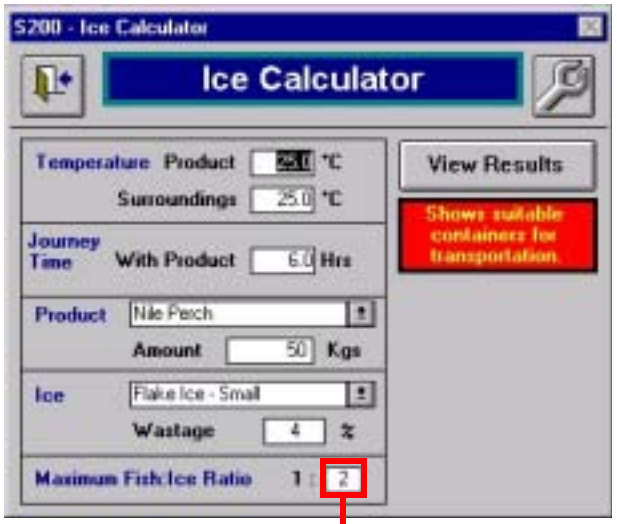
5.1 Ice Calculations

The program also allows calculations to be made, which give the number of boxes needed for a defined scenario, and shows the costs involved.

From the Main Menu, click the Ice Calculator button.

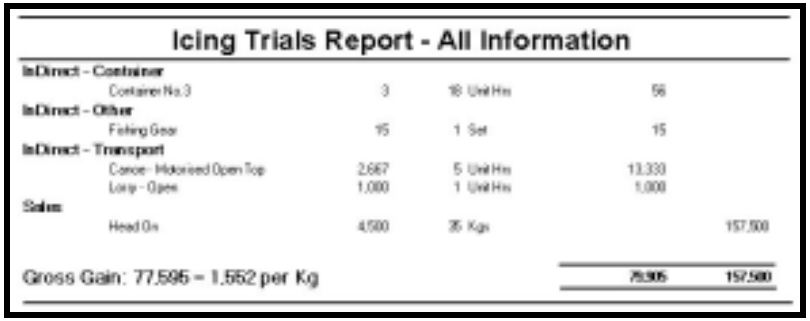


The program will then display the Ice Calculator screen, which will contain the details of the last trial examined.
Details can be entered using field boxes and drop-down boxes.
Then the “View Results” button can be pressed to see the report.



The ratio used can only be a whole number.

4.5 Practical Trial



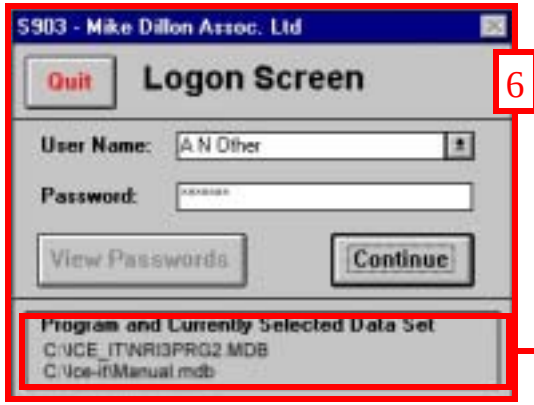
Icing Trials Report - All Information

InDirect - Container				
Container No.3	3	18 Unit Hrs	56	
InDirect - Other				
Fishing Gear	15	1 Set	15	
InDirect - Transport				
Canoe - Motorised Open Top	2,667	5 Unit Hrs	13,333	
Lorry - Open	1,000	1 Unit Hrs	1,000	
Sales				
Head On	4,500	35 Kgs		157,500
Gross Gain: 77,595 = 1,552 per Kg			29,905	157,500

The Gross Gain for the trial is calculated and translated into a figure per kilogram of fish caught.

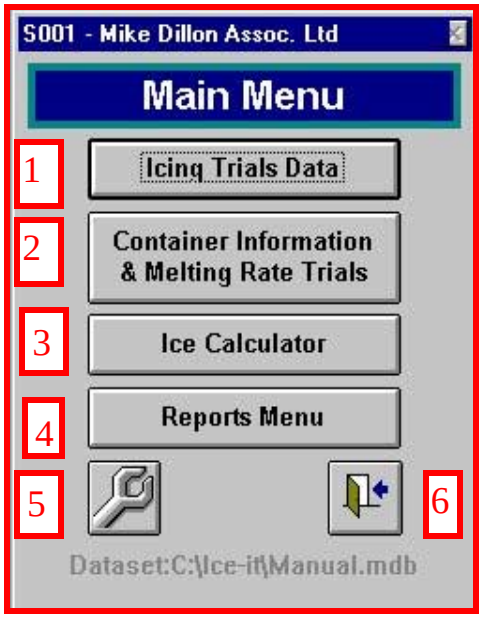
2.1 Logon Screen and Main Menu

To start : Double click system icon on the desktop and wait for logon screen.
Enter name ‘A N Other’ and password ‘letmein’, press enter on the keyboard and then click the continue button.



This shows which data set is currently loaded and where it is saved. This can be changed at manager level.

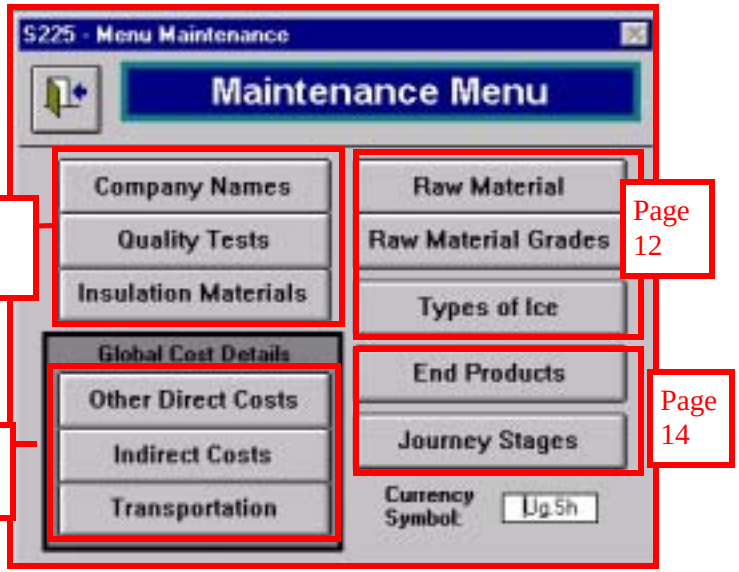
The Main Menu is then displayed ;
1) Icing trials data
2) Container Information
3) The Ice Calculator
4) Reports Menu
5) Maintenance Menu (page 10)
6) return to the logon screen.



2.2 The Maintenance Menu

The Maintenance Menu can be accessed by clicking on the maintenance menu button on any screen in which it appears.

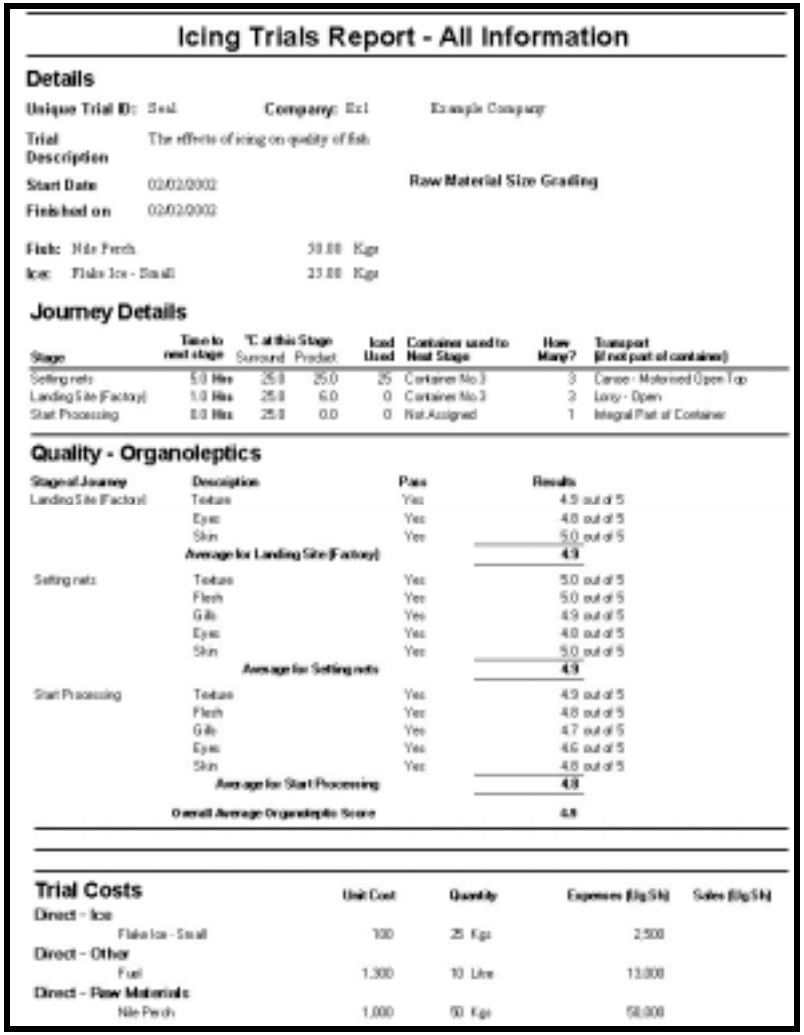
Note: These sub menus should all be set up before any trial information is entered or ice calculations performed. If some information is left out, this may result in calculations being inaccurate.



The Maintenance Menu gives access to eleven sub-menus which hold all of the data which underlies the Ice Calculator, and the drop-down box lists. The required currency symbol can also be added (max 5 characters).

4.5 Practical Trial

12. A report can then be printed which gives a summary of all of the trial details.



Icing Trials Report - All Information

Details

Unique Trial ID: 5ral Company: Ecl Example Company

Trial Description: The effects of icing on quality of fish

Start Date: 02/02/2002 Raw Material Size Grading

Finished on: 02/02/2002

Fish: Nile Perch 50.00 Kgs

Ice: Flake Ice - Small 25.00 Kgs

Journey Details

Stage	Time to next stage	°C at this Stage Surround	Product	Iced Used	Container used to Next Stage	How Many?	Transport (if not part of container)
Setting nets	5.0 Hrs	25.0	25.0	25	Container No.3	3	Canoe - Motorised Open Top
Landing Site (Factory)	1.0 Hrs	25.0	6.0	0	Container No.3	3	Lorry - Open
Start Processing	8.0 Hrs	25.0	0.0	0	Not Assigned	1	Integral Part of Container

Quality - Organoleptics

Stage of Journey	Description	Pass	Results
Landing Site (Factory)	Texture	Yes	4.5 out of 5
	Eyes	Yes	4.0 out of 5
	Skin	Yes	5.0 out of 5
	Average for Landing Site (Factory)		4.5
Setting nets	Texture	Yes	5.0 out of 5
	Flesh	Yes	5.0 out of 5
	Gills	Yes	4.5 out of 5
	Eyes	Yes	4.0 out of 5
	Skin	Yes	5.0 out of 5
	Average for Setting nets		4.5
Start Processing	Texture	Yes	4.5 out of 5
	Flesh	Yes	4.0 out of 5
	Gills	Yes	4.7 out of 5
	Eyes	Yes	4.5 out of 5
	Skin	Yes	4.0 out of 5
	Average for Start Processing		4.0
	Overall Average Organoleptic Score		4.5

Trial Costs

	Unit Cost	Quantity	Expenses (Ug.Sh)	Sales (Ug.Sh)
Direct - Ice				
Flake Ice - Small	100	25 Kgs	2,500	
Direct - Other				
Fuel	1,300	10 Litre	13,000	
Direct - Raw Materials				
Nile Perch	1,000	50 Kgs	50,000	

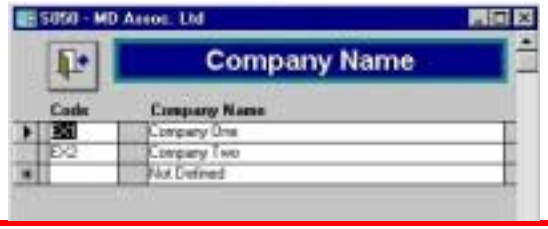
4.5 Practical Trial

10. Click on the Costs button, this brings up a screen with some figures already entered. These amounts (e.g. weight of fish and cost of containers) have been calculated from the data you have already entered about the trial. Enter cost information for fish and ice here.

11. Use the Other Direct Costs and Other Indirect Costs buttons to enter information about other costs incurred during the trial , e.g. fuel, food, nets and motors.
If the products were sold at the end of the trial, income from the sales can also be recorded.

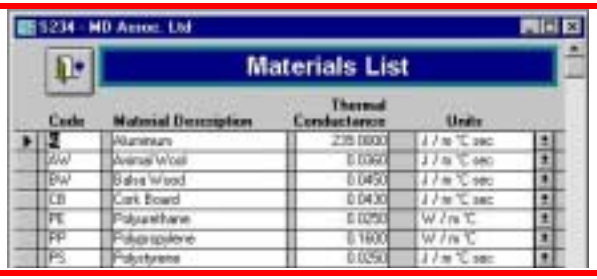
2.2 The Maintenance Menu – sub-menus 1

These eleven sub menus allow you to set up background information / data. After data entry press back button to return to the Maintenance Menu S225.



Company Name
Each company should be identified by a unique reference code, and it's full trading name.

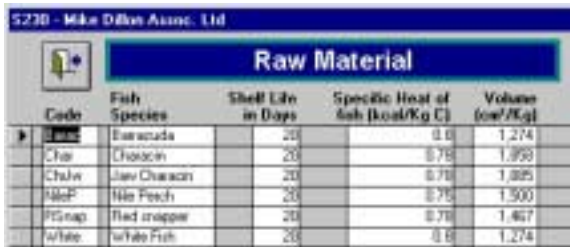
Quality Tests
Details of types of assessments used to determine quality and their units of measurement.



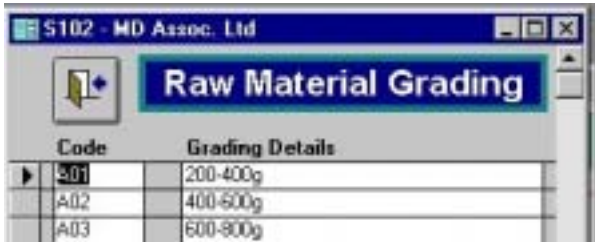
Insulation Materials
Details of each type of material used in the construction of containers should be entered.

2.2 The Maintenance Menu – sub-menus 2

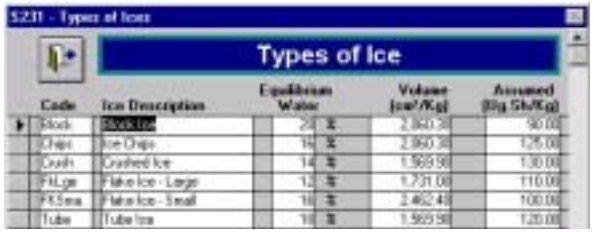
These eleven sub menus allow you to set up background information / data. After data entry press back button to return to the Maintenance Menu S225.



Raw Material
Each species of fish is given a unique code to identify it.



Raw Material Grading
Each grade of fish used should be entered with a unique code.

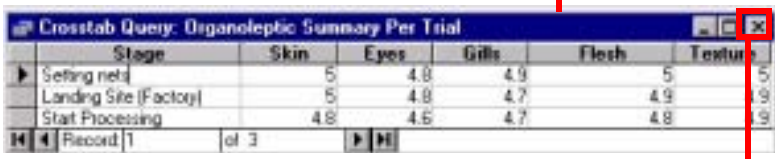


Types of Ice
Costs of each type of ice used should be entered. The data already entered is taken from FAO Technical Manual 351.

4.5 Practical Trial

9. Click on the Quality button to produce a list of tests, and select one. This will bring up a single blank record which can be completed by typing into the blank field boxes, or where they are available making selections from the drop-down boxes. When you have finished entering data for all types of quality test, you should click the 'back one' button to return to the Ice trial Details screen.

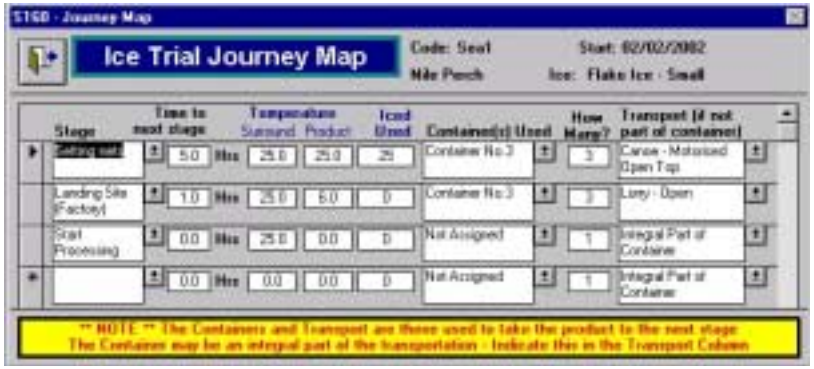
For Organoleptic tests, a summary can be displayed.



Press this cross to close the screen.

4.5 Practical Trial

8. After completing the Ice Trial Details Screen, press the Journey button to continue to the Ice Trial Journey Map. Log the journey details here, including times, temperatures and amount of ice added at each stage. When this screen is completed, press the back button.

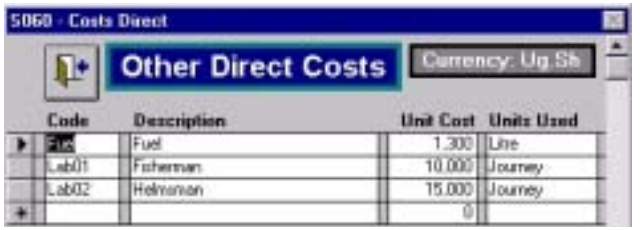


When journey details have been entered for the new trial, Quality and Cost buttons become available on the Icing Trials Data screen.

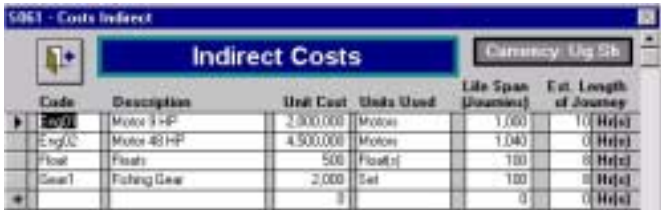
Stage and transport information is maintained via the maintenance menu. Container details are maintained via the main menu, see section 3.1.

2.2 The Maintenance Menu – sub-menus 3

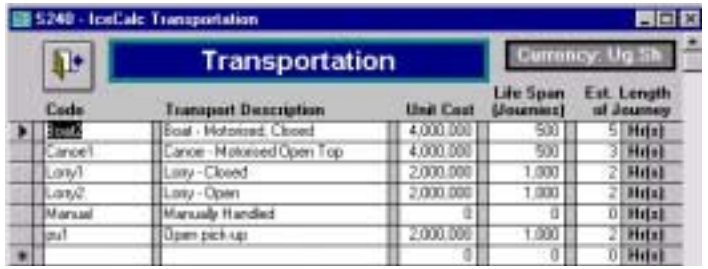
These eleven sub menus allow you to set up background information / data. After data entry press back button to return to the Maintenance Menu S225.



Other Direct Costs
All direct costs (other than fish and ice) incurred during a trial can be listed here.



Indirect Costs
All indirect costs (e.g. motors, nets and floats) can be listed. The software uses this information to calculate a cost per journey.

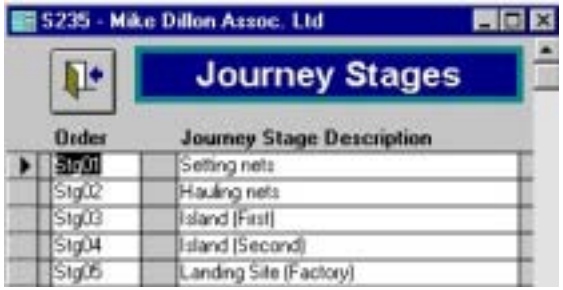


Transportation
All modes of transportation used during a trial can be entered.

2.2 The Maintenance Menu – sub-menus 4

These eleven sub menus allow you to set up background information / data. After data entry press back button to return to the Maintenance Menu S225.

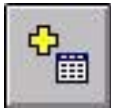
End Products
All end products from a trial can be listed with their value and a unique code.



Journey Stages
All stages in a trial where data is recorded can be defined.
Note: The more stages used, the more data needs to be collected.

4.5 Practical Trial

When the trial is completed, the details can be logged into the program.
6. From S100 the Icing Trials Data screen, click the add new record button.



The program will then display a blank Ice Trial Details record, in which the trial code box is highlighted with a"?". You should begin by giving the record a unique trial code.

7. Complete the trial details, including start date and time, raw material and ice used and a description of what the trial was about. Some lists are available through drop down boxes. When this screen is completed, press the back button.

4.5 Practical Trial

Icing Ratios per Container

Temperature Fish 25 °C Fish Species *Nile Perch* Wgt *50 Kgs* Journey Time *6 Hrs*
Air *25 °C* Type of Ice *Flake Ice - Small* Wastage *4%* Maximum Fish:Ice Ratio *1 : 2*

Container	Journey Time under Ice	Fish:Ice	Containers Required	Wgt of Fish per Container	Total Ice Required	Cost of Ice	Unit Cost of Container	Life Span (Journies)	Cost of Journey
Container No.3	6.0 Hr(s)	1 : 0.4	3	16.7 kg	19.1 kg	1,908	2000	80	1,983
Container No.2	6.0 Hr(s)	1 : 0.4	3	16.7 kg	19.1 kg	1,908	1500	50	1,998
Container No.1	12 Hr(s)	1 : 2.0	7	7.1 kg	100.0 kg	10,000	1000	50	10,140
Test Container	0.9 Hr(s)	1 : 2.0	13	3.8 kg	100.0 kg	10,000	500	15	10,433

In the case of multiple containers, if the "Journey Time under Ice" is less than the declared "Journey Time", this indicates that the containers have insufficient capacity for the journey or require an excessive amount of ice. The Ice has been used up at the declared "Maximum Fish:Ice Ratio".

4. Suitable containers for the trial are then displayed at the top of the report. The amount of ice needed is also displayed.

5. During the trial these records need to be made at each stage:

i Time spent at stage.

ii Temperature of surroundings and product.

iii Amount of ice used.

iv Type and number of containers used.

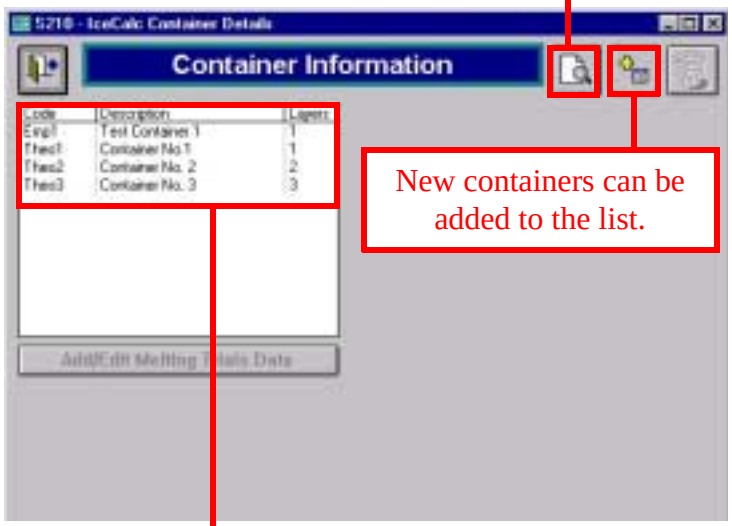
v Type of transport used.

3.1 Container Information

Information about containers needs to be recorded in the program. For information on the trials see page 17.

From the main menu click on the Container Information Button. Details of containers used in trials must be listed here.

A report showing all container melting rates can be accessed here (page 37).



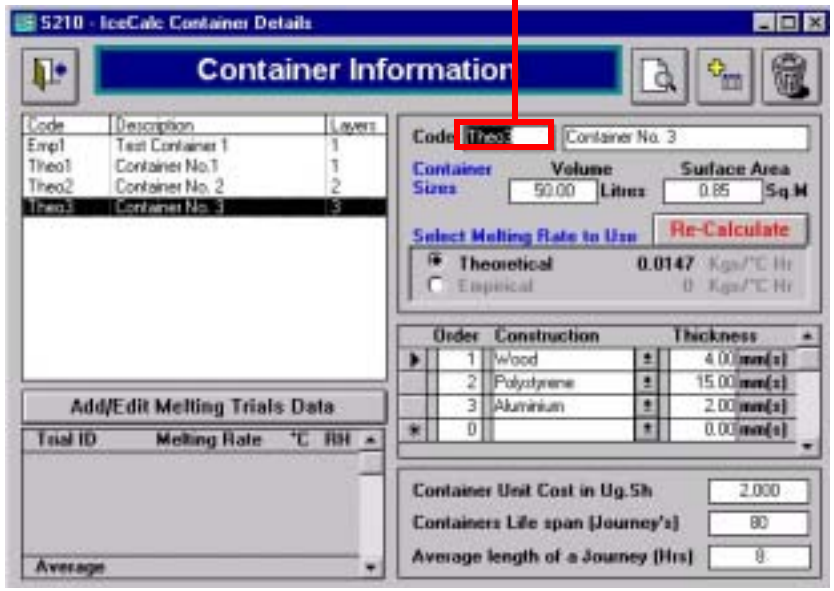
New containers can be added to the list.

Some containers may already be listed, selecting one of these allows you to view/edit the information.

Note: If any container is deleted from this list, any trial information using that container is also lost.

3.1 Container Information

A new entry first needs to be given a unique code.



Container details can be entered from information supplied (unit cost and life span), and from measurement and experimentation (volume and empirical melting rate). The surface area includes all sides, top and bottom of the container. To calculate the empirical melting rate see page

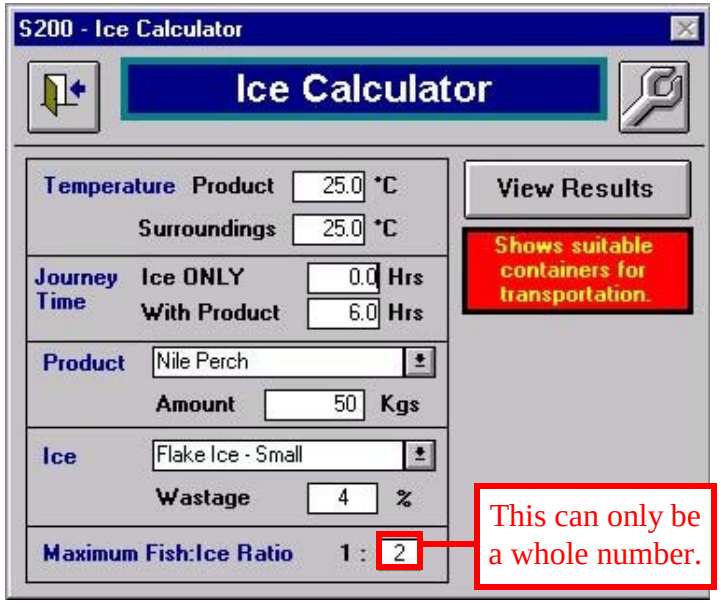
If the type and thickness of materials used to construct the container are known, they can be entered and the program will then calculate the theoretical melting rate. As the first material is entered, another blank insulation layer will be displayed. You can add as many layers as you need to the container, recording the order of each layer .

4.5 Practical Trial

Practical Trial – Using a container at sea.

Before the trial takes place, the Ice Calculator can be used to see how much ice is needed for the journey.

1. Select the Ice Calculator from the main menu.



2. This screen needs information about the trial to be entered, including temperatures, length of journey and types of product and ice.
3. When all of your information has been entered, press the view results button to see how much ice is needed for different containers.

4.4 Validating Trial

Box Melting Rate Trials

Container	Volume (Litres)	Surface Area (Sq.Metres)	Selected Empirical	Theoretical	
Test Container	25	0.50	0.293000	0.268750	(Kgs/°C Hr)

Type of Ice: Block Ice

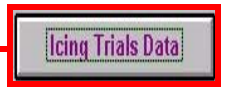
TrialID	Date	Temp.(°C)	Humidity	Time Elapsed	Ice Remaining	Melting Rate (Kgs/°C Hr)	Variance from Theoretical
001	02/02/2002	30	0.8%	0.0000 Hrs	15.0000 Kgs	0.285714	6.31%
				0.5000 Hrs	6.0000 Kgs		
				1.0000 Hrs	2.0000 Kgs		
				1.5000 Hrs	0.5000 Kgs		
				1.7500 Hrs	0.0000 Kgs		
002	02/02/2002	25	0.8%	0.0000 Hrs	15.0000 Kgs	0.309659	11.63%
				0.5000 Hrs	8.0000 Kgs		
				1.0000 Hrs	4.0000 Kgs		
				1.5000 Hrs	1.5000 Kgs		
				2.0000 Hrs	0.0000 Kgs		
Range from 6.3% to 11.6%				Average Melting Rate (Based on Trials)		0.292857	8.97%

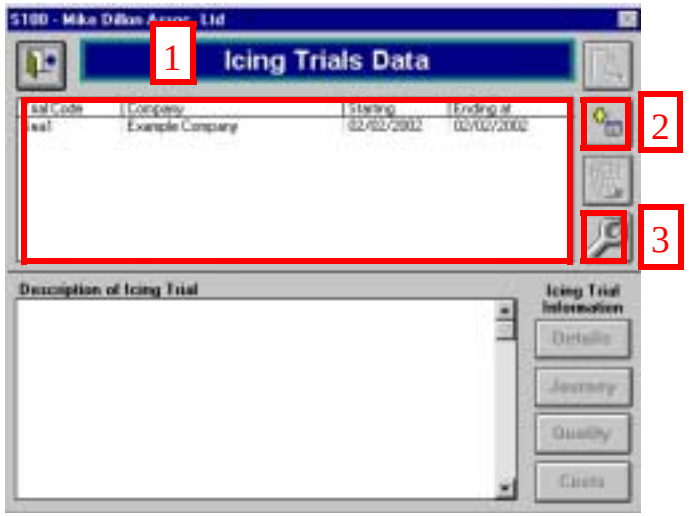
A report is available for the melting rate trials. From the melting rate trial screen, S110, press the report button. It gives details of all trials performed on one box, and summarises the information, grouping it by the type of ice that has been used.

4.1 Accessing Trial Information

Information can be recorded in the program about trials that have been performed. For information on different types of trials see page 19.

From the Main Menu click on the Icing Trials Data button

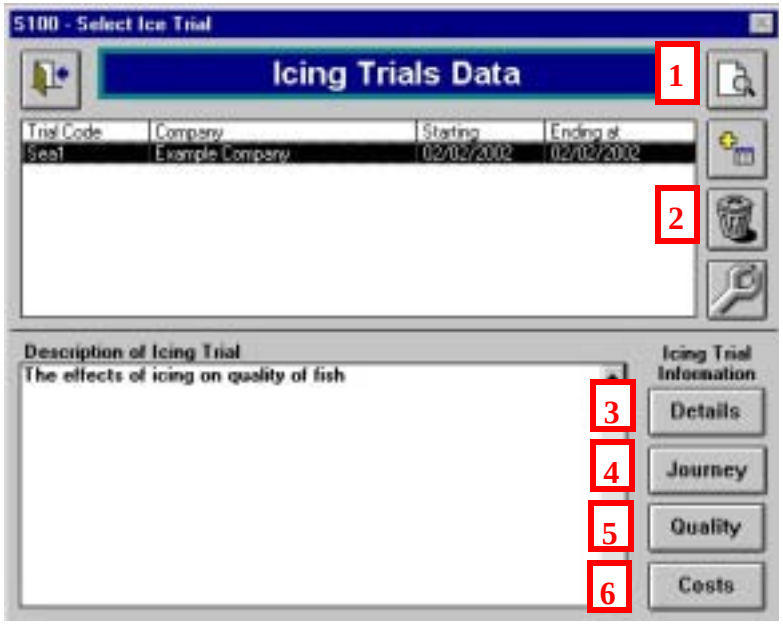




The program will then display screen S100 – Icing Trials Data
This screen shows all previously entered trials.
The initial options are;
1) to select an existing trial from the list (page 18)
2) create a new trial using the add new record button (page 19)
3) access the Maintenance Menu (page 10)

4.1 Accessing Trial Information

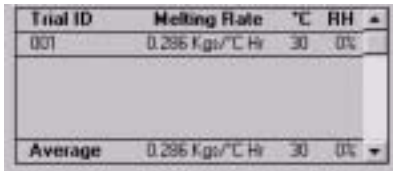
Selecting an existing trial from the list.



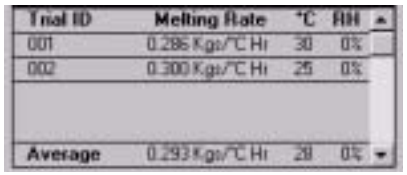
After the selection of an existing trial, the program makes a the remaining screen buttons active.
These provide the options to;
1) view and print the trial report
2) delete the selected trial (you will be warned that this step is irreversible, and asked if you wish to continue)
3) view / edit the details of the trial (page 27)
4) view / edit the journey details (page 28)
5) view/edit the quality assessments (page 29)
6) view/edit the costs (page 30)

4.4 Validating Trial

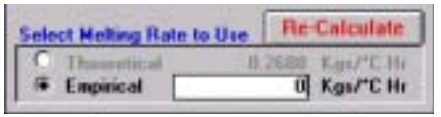
4. After pressing the add new record button, enter details of the trial, including a trial code and description. When all details have been entered, press the back button.



The melting trail information is now shown at the bottom corner of the screen.



If more trials are carried out, the summary information also shows an average melting rate.



5. Any of these empirical rates can be typed in, to use during ice calculations.

4.4 Validating Trial

Validating Trial – Comparing Theoretical and Empirical melting rates.

1. Enter size and material details of the container to be used in the trial. Select the theoretical melting rate and press recalculate.

2. Carry out the melting rate trial, recording weight of ice in the container at different time intervals over the trial and an average air temperature.

3. With the test container selected from the list, press the Add/Edit melting Trials Data button.

4.2 Example Trial Methods

The Trial Management System, which forms part of the software, allows you to record the results of trials. Here are a few examples of the type of trial you might want to perform.

4.3 Theoretical Trial

Theoretical Trial – evaluating different designs for a new insulated container.

1. Enter size and material details of a new container. Select the theoretical melting rate and press recalculate. Enter assumed costs and life span information.

2. Add new designs of containers using different types of insulation, keeping the size constant.

4.3 Theoretical Trial

3. Compare the theoretical melting rates of the different containers by viewing the List of Containers report.

Printed On: 03/03/2000 14:32:14 *Page 1*

List of Containers

Container	Volume (Litres)	Surface Area (Sq.Metres)	Melting Rates (Kgs/°C Hr) Empirical	Theoretical	Construction of Container	
Container No. 1	30	0.85	0.000000	**0.456875**		
Theoretical Melting Rate Used					1 Wood	4 mm
Container No. 2	30	0.85	0.000000	**0.014738**		
Theoretical Melting Rate Used					1 Wood	4 mm
					2 Polystyrene	15 mm
Container No. 3	30	0.85	0.000000	**0.014738**		
Theoretical Melting Rate Used					1 Wood	4 mm
					2 Polystyrene	15 mm
					3 Aluminium	2 mm

The Values in Bold and Boxed indicated the selected value when performing calculations

The container with the lowest melting rate will use the least amount of ice, but costs and life span should be considered. In this example, although Containers No. 2 and No. 3 have the same melting rate, Container No. 3 has an aluminium layer which will protect the polystyrene insulation layer and give the container a longer life span.