

# Crystal

## Completing the Management Circle



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Dairy farming is becoming an increasingly complex and sophisticated business. The need to have accurate, up to date information on which to base herd and business decisions is essential. In addition to this, growing consumer interest, animal welfare, traceability and food quality are all areas where there are increasing demands for accurate record keeping in relation to farm activities. It is impossible to satisfy all these demands from manual records.

Automation is a real aid to good management practices. With the right information on cattle health, welfare, milk production and costs, the farmer can make the correct herd management decisions. Automation also frees time from mundane manual tasks allowing the farmer to concentrate on what matters - managing his farm.



Crystal automatic animal observation AND animal handling.

Crystal is the practical and easy to use herd management software that completes the Management Circle by fully automating the four steps of dairy management. It controls and automates all the processes on the dairy farm. This sophisticated automation system is a Crystal clear management tool for automatic animal observation and animal handling that optimizes the dairy herd management routine.

Management, by definition, is a circular process with four steps:

- 1 Observe: Management starts with observing situations and circumstances.
- 2 Analyse: Second step is to analyse observations.
- 3 Control: Then decisions are made to control and change circumstances.
- 4 Report: Results decisions are reported and the observations start again.



Crystal takes care of process control, information management and decision support to improve livestock farming productivity, profitability and lifestyle.

### Crystal Precision Herd Management

The most important features of the system:

- Automatic animal observation by reliable and accurate sensors measuring: yield, conductivity, temperature, blood, pedometer activity, animal weight, feed intake.
- Analyse and combine all sensor information with animal agenda and treatment events based on user defined parameters.
- Automatic animal handling depending on conditions set, e.g. divert animals or milk, adapt feed or milking treatments.
- Easy to use attention lists that show relevant information at an early stage. Actions can be entered directly in the list to combat problems immediately.
- Link all information to other stakeholders via the world wide web.

### Crystal's Modular Construction

The PC is the centre of the Crystal Management Circle, which makes Crystal totally flexible, enabling each user to customize the presentation of information to best suit their needs. Employee, consultant, veterinarian, and many other users can have access to Crystal information, each with their own language. Access and modification rights are determined by the farm manager for each user. As a modular construction, each user only "sees" the information which is relevant to their installation.

### Crystal's Extendable Network Architecture

Networking architecture of Crystal throughout the farm buildings enables easy up scaling. For instance farms can start with FullFeed automatic concentrate feeding or milking parlour automation and extend the system later with advanced 'plug-in' devices like milk meters, automatic milking systems, or advanced sensors in the parlour. Crystal operates with the same layout in every module, enabling easy upgrades in future. Depending on the farm circumstances different wireless process and PC networking solutions are available.



"Observing and treating my herd in one go really saves me a lot of time"

## The 1st Step: Automatic Animal Observation

Crystal supports easy integration of automatic sensors at any stage, like e.g.:

### Sensomatic: Milk Monitoring Assistant

The Sensomatic Free Flow milk sensor and information terminal are developed with the needs of milker and animal in mind. It is easy to use and can be installed readily in any milking parlour. It controls all essential milking functions such as pulsation and cluster take off as well as providing valuable information, such as: yield, conductivity, flow rate and temperature.

The Sensomatic's Free Flow sensor is capable of measuring a wide range of milk yields, which means that it is very well suited for cows and also camel, sheep and goats. Sensomatic monitors the complete milking and cleaning process and reduces the time spent in the milking parlour.

### AfiFlo and AfiLite milk meter:

The Fullwood Packo Group has the longest tradition of approved milk meters, with many units being installed since 1984. AfiFlo and AfiLite are ICAR approved milk and conductivity meters.

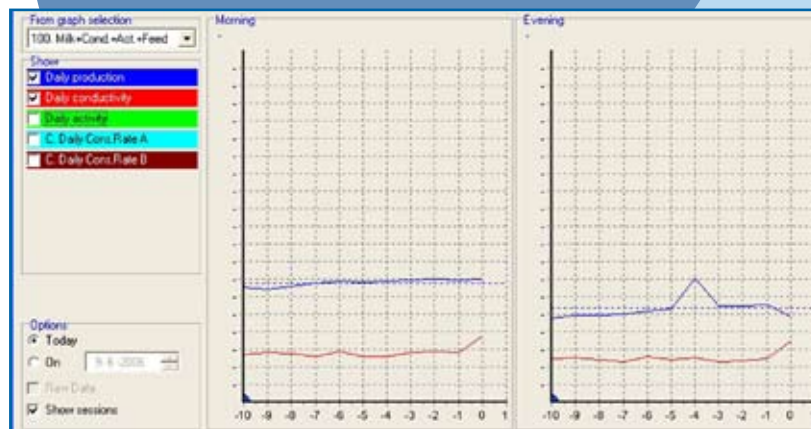
### Milk Conductivity and Temperature Measurement

The Sensomatic, AfiFlo and AfiLite all measure milk conductivity and together with Crystal provide a reliable indication of udder health. Any deviations will show instantly on the milk meter, enabling the operator to take immediate action. Timing is essential in optimising the effectiveness of treatment. Research shows that the average time from the first alarm to clinical mastitis is only 17 hours.



#### Sensomatic highlights include:

- Clear keys and display for ease of use.
- Free flow sensor, so no milk damage and no additional cleaning fluid needed.
- No maintenance required as there are no moving parts.
- High quality conductivity and temperature measurement.
- Automatic operation of parlour gates and animal sorting.
- Quick pick up and alert for cluster kick off.
- Per stall cleaning alerts for amount, temperature and quality of rinse water.
- Centralised parlour commands to set all stalls in/out of cleaning mode.

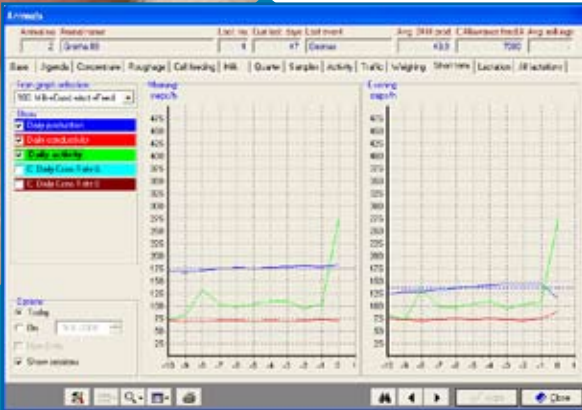


#### Scientific research udder health alerts:

- Total number of alarms per group per day: 1.6%
- Early alarms for clinical mastitis: 95%
- Cows without alarms but with clinical mastitis: 1%
- Average duration between first alarm to clinical mastitis: 17 hours
- Cost per mastitis case: 245 €

**Scientific research: Effect of leg pedometer introduction on practical farms:**

	Before pedometers	With pedometer
Interval calving – first insemination (days)	78	67
Interval calving – conception (days)	104	84
Calving interval (days)	385	365
Number of inseminations per conception	1,8	1,6
Percentage pregnant after 1st insemination	55	62



**Observations of Individual Quarters**

Merlin automatic milking systems are equipped with a variety of sensors for milk contribution, conductivity or blood. Official scientific trials in Denmark and New Zealand have shown that Merlin accurately detects 80-100% of clinical mastitis cases with a specificity of 93-98%. Outstanding results are achieved by accurate (temperature compensated) measurements.

**Pedometer Aid Fertility and Health Management**

Crystal activity monitoring is an effective tool in fertility management. The step counting pedometer is worn on the cow's leg. It is a proven device assisting in determining oestrus cycles and health exceptions. On many farms, practical experience has led to heat detection being completely taken over by Crystal, thus reducing labour and improving profits.



Should the farmer wish to use pedometers on a small group of cows for heat detection in combination with an other ID system, Crystal is able to accommodate this as it supports multiple types of tags in the same system and on the same animal if required.

**Animal Identification:**

Efficient identification systems are essential for accurate animal observation. Crystal can be linked to a variety of ID tags and ID antennas like:

- ISO standard Tiris and Nedap based identification systems.
- Pedometers, neck transponders as well as ear tags and bolus ID.
- Per stall, entrance, edge or Watch identification antennas.

**Feed intake and Body weight**

A complete range of feeding and weighing equipment is available which can measure the concentrate or roughage feed intake as well as measuring body weight. Many practical Research Institute farms use these sensors to monitor the health and profitability of animals to the level of the smallest detail.



**Innovative Identification: Watch ID**

The unique cost effective Watch ID system offers reliable identification that meets the accuracy of per stall ID. The system uses a special "watch" ID unit worn on the milker's wrist detecting both stall position and the animal tag when the milk cluster is attached. Watch ID is easy to install in all types of parlour.



**"It is so easy to find bulling cows or sick animals!"**

## The 2<sup>nd</sup> step: Information Analysis

### Agenda and Events recording

The Crystal agenda clearly illustrates the animal's fertility cycle using graphics and icons rather than lots of tables. It stores all fertility, calving, health and treatment events, including embryo transfer. Each animal's history is permanently stored, enabling long term traceability to meet the needs of Quality Assurance organizations.

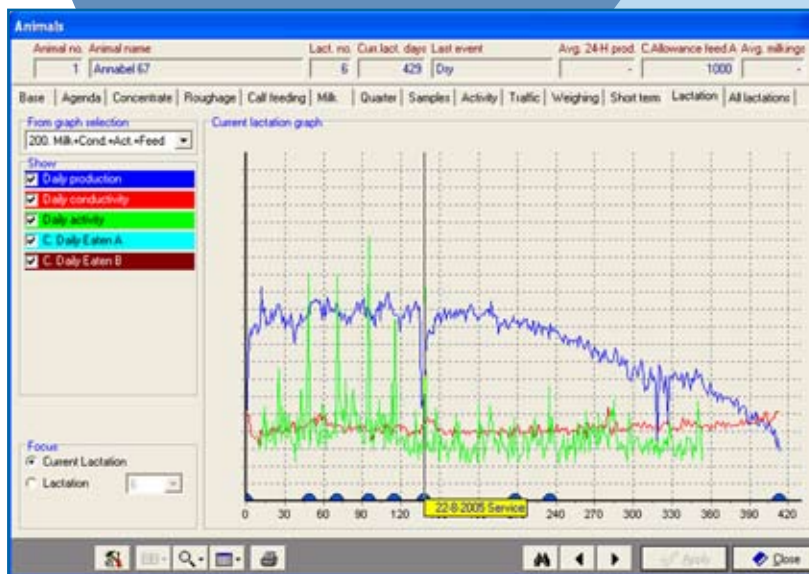
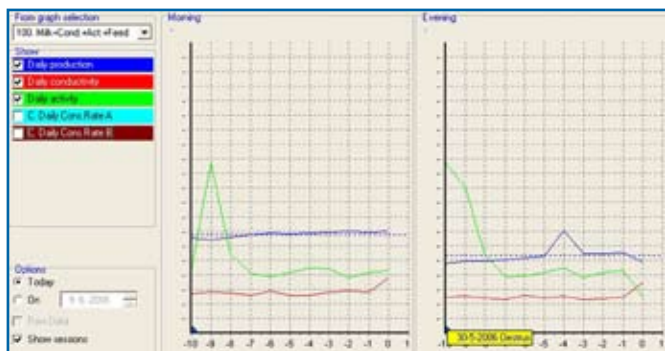
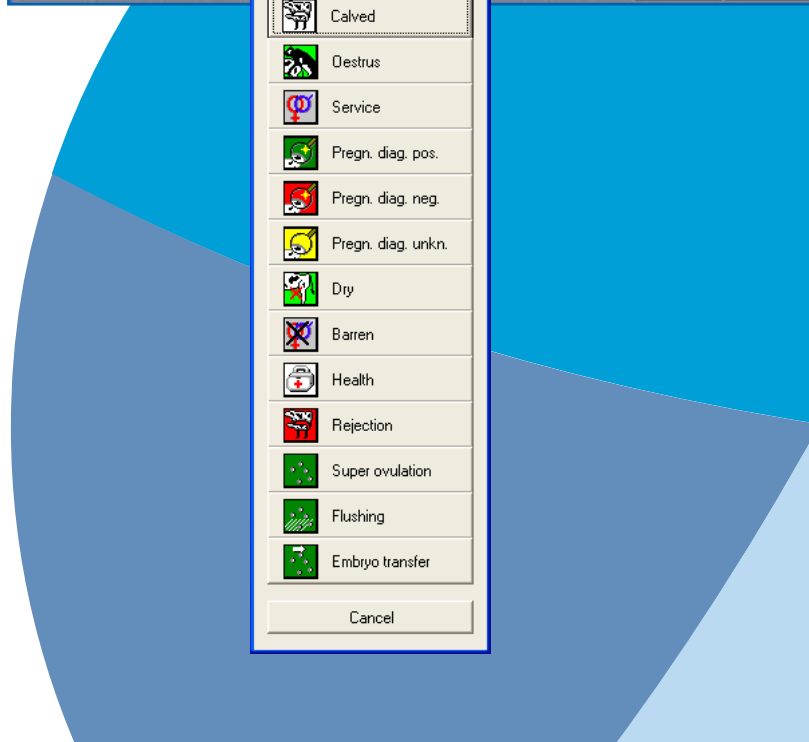
Newborn calves and animals leaving or arriving on the farm can be registered with animal registration authorities. Milk sampling data can be exchanged with milk control boards.

### Graphic power of Crystal

Crystal provides all information in clear graphs and pictures. A few examples:

- Agenda overview presents recorded and expected events in an easy to read time line.
- Lactation performance is presented in clear graphs including agenda events. Just watch the obvious oestrus cycle in the green activity graph below:
- Last ten days' graphs present the health and production profile of an animal. Note the clear red conductivity graph alerting udder problems at an early stage before the milk yield and activity drops down in the following milking.

The user defined summary bar always appears at the top of the screen showing the performance indices of the individual animal.



### Three Mouse Clicks to Profitability

Crystal opens with a user defined list of important attention and action lists. The very first mouse click in the morning informs the farm manager about the performance of the whole herd, including an overview of which groups within the herd are responsible for performance deviations.

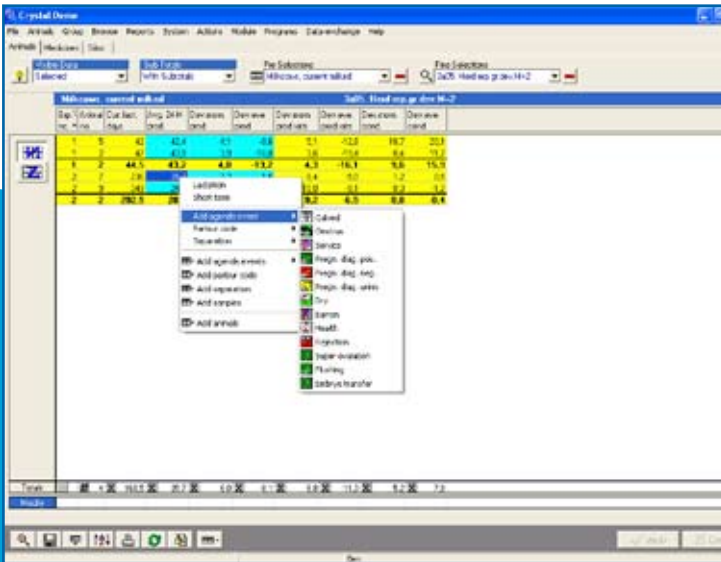
### Fast Management by Exception

Each subsequent click presents detailed graphical information of individual animals requiring attention. It provides the opportunity to analyse the cause of deviations. The interactive attention list is the place to analyse and change animal settings at the same time. So, in just a few minutes, two or three times a day, the user can observe, analyse and change settings for the whole herd, its groups and attention animals.

### Wizard and ParlourMonitor: Solid User Interface in the Parlour

Not only is animal information necessary in the farm office, but also where the herdsman observes and treat the animals. The stainless steel Crystal Wizard and ParlourMonitor with durable touch screens are the answer to this information request without the need to build a 2nd computer area. A Wizard or Parlour Monitor can be used to observe, analyse and handle the animals in the same way as in the farm office.

Different solutions are available from low cost 'information only' screens to advanced units incorporating a full size Crystal program and touch screens. This completes the Management Circle in the parlour, including all Crystal clear management attention lists and instant fast data input.



"A few clicks of the mouse show easy pictures to manage my herd."

## The 3<sup>rd</sup> step: Automatic Animal Handling and Control

### Full Automatic Treatment and Handling of Animals, the Action planner:

The Action Planner module in Crystal can fully automate processes in response to a combination of events. Depending on parameters and conditions set by the farmer, the system carries out the appropriate actions fully automatically.

### Parlour Control

Fullwood has a wide range of milking parlours available from auto tandem, herringbone parlours, rapid exit side by side, to large rotary parlours with up to 100 stalls on the platform. Crystal automation systems can play a central role in the control of many processes in the milking parlour, such as automatic control of animal traffic. In this way the milker is able to concentrate on the milking process and Crystal controls the mundane processes such as opening and closing the gates or separating animals. Of course the milker remains in charge and is able to override the automatic control at any time.

### Merlin and Crystal: Freedom through Flexible Solutions

Automatic milking with Merlin is a proven technology and the central component to this is Crystal. Crystal not only monitors and controls the milking system with precision, it also takes care of the cow, udder health monitoring, feeding and milk quality. In short, all of the important issues of milk production and associated management processes. A key requirement for an automated milking system.



### Just a few examples of the Action Planner features:

- Automatic grouping and separation of animals in different barn areas based on: milk performances; age; lactation stage; agenda events or other data elements in the database.
- Automatic change of Feed, Merlin or parlour settings depending on what ever element or automatic observation the manager wants. This also enables automatic separation of abnormal milk depending on the results measured by the quarter conductivity or blood sensor.
- Automatic separation of animals to the treatment pen based on: combinations of deviation in yield, conductivity, activity (heat), lactation stage, parlour codes or other data element available in the program.
- Group wise animal control, which makes it possible to change visit regimes to feeding stations based on the animal group number or to automatically separate milk of certain groups of animals.







### Animal Traffic

Moving animals around on the farm is one of the most time consuming activities. Crystal automates cow traffic control. Smart antennae and gates direct animals along a pre-programmed route. If necessary, separation gates can redirect the animals into an isolation pen for treatment. Different production groups can be sent into a variety of areas. In the case of Merlin automatic milking, cows can be sent out to graze depending on the time of day, expected milk yield, milking times and any other parameter in the program using the Crystal Animal Action Planner.

### Stand Alone Animal Separation

A simple stand alone cow traffic unit is available without a link to Crystal, which simply diverts any cow that has been given a leg tag during the milking process. Animals without a tag can walk to the barn as normal and any animal having the special separation tag will be diverted.

Crystal feed modules have unlimited feeding features, like:

- Target feeding and feed curves.
- Feed to Yield curve to adapt allowances to milk yield, fat and protein contents.
- Bonus to adapt to temporary weather influences.
- Variety of distribution options, like: periodic, save feed and wait time feeding.

### Precision Feeding with Crystal, less waste, more profit

High yielding animals demand designated feed rations. However, lower producing companion animals should not get access to costly feed. This can be achieved by computerized Crystal feeding being able to accurately dispense concentrate, roughage, liquid and calf feed in many different ways.

### Concentrate

Concentrate feed can be dispensed in and out of the milking parlour and in automatic milking system. Feed additives like Propylene glycol are also supported.

A low cost alternative to the Crystal based feeding program is the FullFeed feeding processor. This stand alone controller is an easy to operate feeding computer incorporating many facilities including target feeding.



"If my neighbours could see how easy feeding and treating of the animals have become!"

### Calf Feeding

Crystal can also control calf feeding stations. Powdered milk, natural milk, water or concentrate feed can be dispensed to young animals. Combinations of different stations can be used to dispense liquid in one and concentrate feed in another, while both of them are supported using the same feed curves or other calculation programs.



### Roughage and Liquid Feeding

Many farmers want to profit from the advantage of feeding a mixed ration made from a number of ingredients. With a Crystal automatic feed barrier the farmer can accurately dispense roughage feed products according to individual allowances. Crystal controls the roughage barrier similar to an out of parlour feeding station and is carried out on a time based principle. This special feed barrier is just a part of the normal feed barrier with the advantage that cows do not need to be grouped for feed ration purposes.

### Research Feeding

For Research Applications, the automatic feed barrier can be extended with weighing troughs in front of each stall which records each gram of roughage feed eaten from the bin. Special designed troughs are available in a range of sizes and specifications.



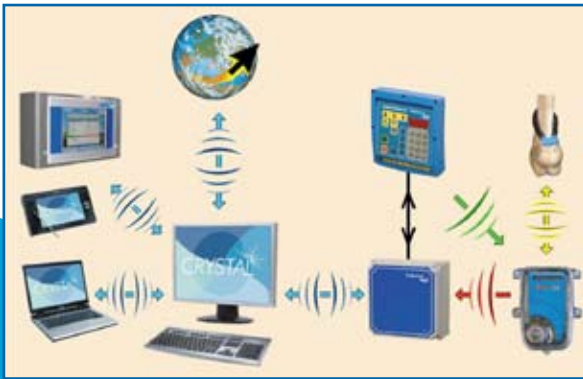
### Around the Clock Rotary Feeding

A unique way of feeding automation and parlour control is the feed rotary option. In this case a rotary platform is used to feed all animals on a number of occasions per day between milkings. This saves cost on building constructions, feeding barriers and feeding stations in the barn.



Seq	Animal	Can last	Aug 2014	Den room	Den area	Den room	Den area	Den room	Den area	Den room	Den area
no.	id	days	total	total	total	total	total	total	total	total	total
1	1	42	42.4	4.1	0.8	5.1	11.7				
1	2	42	43.0	3.5	0.9	3.0	15.4				
1	3	44.5	43.2	4.0	13.2	4.3	16.1				
2	1	106	94.7	7.2	16.0	8.4	62.4				
2	2	252.5	26.3	8.8	3.1	9.2	48.5				

## The 4<sup>th</sup> step: Automatic Reporting and networking



### Crystal Wireless Network Solutions

Farm information within Crystal is transferred through one single network cable to which all embedded systems are connected. Wireless solutions are also available in situations that cable network are impossible. This makes it possible to transfer data to mobile devices like rotary platforms, mobile animal activity or feeding stations. The Crystal network in the barn is an independent process system, which allows the PC to be switched off or used for other tasks even during milking.

Within the farm several PC's can be connected to the same Crystal system by means of standard office networking. These can also be laid out with wireless devices. It is possible for several people to work in Crystal at the same time, each at their own PC using their own access levels and user interface settings.

### Agricultural Networks

Crystal can be linked for data exchange to other herd management systems using the ADIS (former Taurus) protocol, the standard link for dairy farm computer systems. Export of Crystal databases can be made to standard spreadsheet or statistic applications like Excel or SPSS. Crystal can also be linked to official bodies such as breeding associations, milk recording agencies (EDI EMM), or animal movement authorities (EDI I&R).

### Support

Crystal users have a choice of ways to receive support:

- Crystal has an extensive and detailed "on screen" help system where answers to all questions can be found, not only with an explanation of the program but also with very useful suggestions as to how to get the most out of the completed Management Circle. The help system is page sensitive and jumps directly to the required topic.
- Of course any Crystal user can consult the local distributor or local helpdesk for comprehensive support in his own language. Fullwood has a skilled group of people to ensure you, the end user, receive excellent service.

Days	
Calving	25
Dry off	25
Service	1
Pregnancy diagnosis	25
Oestrus	1



"Great and reliable partners, that feels good"

# CRYSTAL

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Management Circle



"AS ALL FP GROUP COMPANIES HAVE A POLICY OF CONTINUOUS IMPROVEMENT, WE RESERVE THE RIGHT TO ALTER ANY SPECIFICATION WITHOUT PRIOR NOTICE. WE ARE CONSTANTLY DEVELOPING AND INTRODUCING NEW ITEMS TO OUR RANGE. SOME PRODUCTS MAY CHANGE FROM THE DESCRIPTION IN THIS DOCUMENT. DETAILED INFORMATION IS AVAILABLE ON REQUEST OR IN OTHER PRODUCT LITERATURE. WHILST EVERY CARE HAS BEEN TAKEN IN THE PREPARATION OF THIS BROCHURE, WE ACCEPT NO RESPONSIBILITY FOR ANY ERROR ARISING FROM ITS MISUSE."