

Trends in milking and cooling technology

New developments in milking and cooling technology should be for the benefit of the cow, udder health and working ergonomics, the latter increasing to ease strenuous and repetitive work, mainly through automating such tasks. Increasing awareness of the environment represents a further cornerstone in the development of new products and technologies – which still must still remain justifiable in terms of cost.

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Dairy farm incomes are being hit by sinking milk prices, high quota costs and rising wages. Despite this, rapid developments and interesting innovations continue in milking and cooling technology, not least because of the infrastructural changes and the application of automatic milking systems.

Vacuum production

Vacuum pumps have to give reliable output in large plants. Despite the varying vacuum requirements during milking the vacuum pump runs at consistently high performance. A possibility for reducing the energy requirement is the application of frequency-controlled vacuum pumps with performance steered by the actual vacuum requirement. Through the application of this technology energy requirements can be substantially reduced. Especially when using robotic systems where the pump is in action round the clock, frequency controlled vacuum pumps represent a valuable further development. Usually, the highest performances are required of vacuum pumps during the cleaning routine. To be sure of a satisfactory cleaning system for the high-volume milking pipeline and to keep the energy requirements as low as possible the application of a second vacuum pump for the cleaning programme can offer the same performance with energy savings.

Vacuum controlling valve

Controlling valves must ensure a constant vacuum, a need best met by modern servo controlling valves. With high pump performances, air throughflow at the valve also increases, often meaning increased noise. Manufacturers have put a lot of effort into reducing the noise level at the milking point through using insulation as well as a separating sensor and valve.

Layout and dimensioning

Minimum requirements in the design of milking plants are contained in ISO 5707. Over and above these requirements the manufacturers try to plan their milking equip-

ment with a certain amount of additional reliability. This effort is welcomed from the point of view of the increasing biological performance of the dairy cow as well as the need to increase labour productivity. Large-scale layout and dimensioning is aimed at providing enough free play for future enlargements. The required increase in energy and cleaning inputs alone means a limit to pipeline dimensions.

End unit and milking pump

Stainless steel air separation containers have proven robust and hygienic and through their low level construction leave room for more free play in construction.

Pulsators

Independently from the manufacturer involved the alternate and simultaneous pulse systems both remain. Using electronics has meant most manufacturers can offer a wide range of vacuum/release configurations but still factory settings should only be altered after discussion with experts and according to results. Despite many discussions the establishment of 60 double beats per minute with a 60:40 pulse relationship has established itself in most cases. The development of milk flow controlled pulsation offers an extension to present pulse settings and this should provide interesting developments in the future.

Mechanised stimulation aids have proved useful. There are differences between time and milkflow controlled stimulation. Scientific investigations have shown that time controlled stimulation aids are more effective. Mechanical stimulation aids have a role in milking management where farms and herds are expanding.

Clusters

Cluster design depends on manufacturer philosophies based on separate experiences with different cow, milker temperaments and milk producers worldwide. The physical attributes of the parlour determine whether light clusters with plastic cups or heavy clusters with stainless steel cups are best. Claw capacities nowadays lie between 250 and



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350 ml. In Germany nowadays the tendency is towards lighter, anatomically matched clusters which can easily handle highest milkflows. Despite a number of advantages silicon liners have still not established themselves on the market. Even for the advantages of food regulation compatibility, long working life and good compatibility with „strich“ and udder, the price is still too high for many milkers and demand has remained with the lower priced conventional neoprene-rubber liners which are now also softer than before and anyway milkers are often loath to change from a known rubber, especially with the vast range of unknown qualities on offer. Needed here is more information from manufacturers on characteristics and working performance.

Positioning

An important building block for successful milking is the optimum positioning of the clusters. To help here, the manufacturers offer a wide range of positioning aids. In the applicable milking systems the future belongs to the ideas with low service demands. They guarantee mostly a simple, reliable and consistent positioning of the cluster under the cow.

Milking out aids

The application of milking-out aids can be advantageous in larger milking systems. The control should be via the milkflow sensor to give reliable and consistent performance according to the desired threshold value. In smaller plants with good milking management milking-out aids are not always cost-effective.

Automatic cluster removal

To avoid dry milking the application of ACR is advisable in all parlours. New sensors guarantee good and reliable removal according to milkflow and entered times. Milkflow limits for removal have risen to 250 to 300 ml/min.

Cleaning technique

Here, circulation and boiling water systems have established themselves. The decision for one or another system can depend on the hardness of the water and the electricity power available. In general one should follow the manufacturer recommendations. To be preferred are systems with a low demand in energy, cleaning material and water and with guaranteed cleaning and disinfecting properties. Electronic control and monitoring characterise modern cleaning systems.

Height adjustable flooring

Hydraulically adjustable floors have been especially developed for parlours. These allow the height of the parlour floors to be adjusted for the milker size to allow good working position during milking.

Parlour system

For herds of up to 100 cows the favourite design remains the herringbone with angles from 30 to 55 degrees. Even when in some cases side-by-side and tandem apply well the herringbone has proved itself over the past 40 years as still fit for the future. In farms with growing herds group milking with quick release and carousels offer a choice. Here, milk output per labour unit should be the measure. In group parlours it is difficult to achieve more than 60 cows milked per labour unit per hour. In carousels this figure can rise to 90.

So that optimum throughput can be achieved attention must be paid to the dimensions of the waiting area, the parlour and the exit/selection area. Only where the cow can swiftly enter the parlour and leave it again without any hindrance can optimum throughflow be achieved.

The waiting area should be so designed to allow the application of a driving aid if this is needed.

The selection possibility must be controllable via the herd management program

or manually from the parlour and the right system of singling out animals for inseminating, pregnancy checks or treatment can save a lot of time.

Herd management

Electronic management systems have established themselves on farms with growing herds even though it can be observed that many operators have difficulties in applying the many evaluation possibilities of programs. Optimum training and introduction and user-friendly operation should be the aims of the developer so that, here too, time can be effectively saved and thus farmer-acceptance increased. A good management program should fulfil the following criteria:

- simple operation help
- good oversight
- high proportion of automatically recorded data
- simple monitoring functions for milking and cleaning technique
- monitoring of cow performance and behaviour
- good cow selection possibilities
- good compatibility with feeding, parlour and selection gates.

Cooling technology

The requirements for modern cooling systems have not altered greatly in the last years. Aims should be for low energy consumption and a good electronic monitoring program. The application of precoolers has become established on many farms. Even where the warm water from the heat exchanger can be used, this technique should be retained. The application of pre-warmed water from storage containers is not always without problems. In such instances very important is that the storage temperature of the water should at no time exceed 17 °C. Especially in summer it can be seen that animals prefer fresh cold water from the pipeline against the stored water. Despite this, the use of precooling plates is efficient in many cases.