Milking of cow

MILKING – Lactation

is the continuous secretion and storage of milk in the udder. The milk ejection or ‘let-down’ reflex effect is short term, inhibited by pain or fear but stimulated by good husbandry practices. Even so, at least 10% of secreted milk will be retained in the udder as residual milk. Removal of milk is achieved when external forces such as suckling or milking open the teat duct at the teat end.

**MILKING INTERVALS**

affect the amount of residual milk carryover between milkings. Equal intervals of 12 hours give highest lactation yields but the effect of unequal intervals is small up to 16 and 8 hours and can be minimised if the highest yielders are milked first in the morning and last in the afternoon.

**MILKING**

Dairy farmers, with varying levels of skill, knowledge and resources, maximise returns from milk production by influencing lactation through selective breeding and control of reproduction, nutrition, disease and general management. The methods of milking have a particularly important effect because a cow cannot secrete over a period more milk than is removed by milking. Thus, maximising milk removal in ways which are economic will take fullest advantage of secretion potential.

**Lactation**

Lactation includes both milk secretion and storage in alveolar cells and ducts within the mammary gland, followed by milk ejection (let-down) and milk removal. Milk secretion is continuous and usually at a constant rate for at least 12 hours resulting in a gradual increase in internal udder pressure. Milk ejection is a neuro-hormonal reflex initiated by various stimuli at milking time. These stimuli, which reflect good husbandry practices, are either natural (inborn) or conditioned (learned by experience), including, for example, feeding and udder preparation. They cause the alveoli and small milk ducts to contract forcing milk towards the udder sinus. Once this has happened most, but not all, of the milk can be removed when external forces such as suckling or milking open the streak canal (teat duct) at the teat end, but at least 10% will be retained in the udder as residual milk.

**Milking intervals**

The 10%–20% of the secreted milk which is not expressed from the secretary tissue and is retained in the udder when milking is completed is called ‘residual milk’ and has a much higher fat content than even the end-of-milking strippings. The quantity of residual milk is proportional to total yield, so that with unequal milking intervals there is a larger net carryover of milk fat from the longer night-time to the shorter daytime interval. This accounts for the apparent faster secretion rate and higher fat content of afternoon milk production. Milk yields, particularly from higher yielding cows are usually greater when milking intervals are 12 hourly. The effect of uneven intervals is not large up to 16 and 8 hours, and can be minimised by milking the higher yielders first in the morning and last in the afternoon.

**MILKING FREQUENCY**

MILKING FREQUENCY affects total daily production. Milking three times instead of twice daily will raise milk yields by an average 10%–15% but up to 10% of this increase will be required to cover extra costs. Chemical composition of milk is unaffected

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| **INCOMPLETE MILKING**  either from excessive amounts of residual milk or end-of-milking strippings can be avoided by effective milk ejection stimulation and by efficient fast milking by hand or machine.  Milking frequency  As a general rule, herd lactation yields will rise as the frequency of milking is increased. On average, the rise in milk yields will be between 10% and 15%, the largest increases occuring amongst heifers. The chemical composition of the milk (fat and solids-not-fat) will be unaffected. Recent commercial data from developed dairying areas also reveal that, on average, up to 10% increase in yield is required to cover the extra costs of milking three times daily. The full benefit of the increased frequency is obtained by milking three times daily throughout lactation rather than reverting to twice daily when milk yields begin to fall. The reasons for the increase in lactation yields are inconclusive; the most likely being the more frequent removal of secretion inhibiting substances which begin the drying-off process. |
| **INCOMPLETE MILKING**  either from excessive amounts of residual milk or end-of-milking strippings can be avoided by effective milk ejection stimulation and by efficient fast milking by hand or machine. |

**Incomplete milking**

There are two forms of incomplete milking. One is that excessive amounts of residual milk are retained in the udder because of inadequate milk ejection stimuli or the inhibitory effects of adrenalin secreted by cows becoming frightened and upset during milking, or even by slow milk removal. The other form is that some of the available milk is left in the udder when milking ceases, ie., the so-called ‘strippings’. The modern milking machine is designed to remove 95% of available milk without recourse to additional cluster weight or manual assistance. Hand stripping, particularly with the finger and thumb should be avoided. The amounts of strippings are likely to be small even in relation to normal levels of residual milk and if not removed are unlikely to affect significantly either the lactation yield or quality of milk.

**MILKING ROUTINES**

are a reflection of good stockmanship. Cows are creatures of habit; avoid any circumstances which upset or frighten them and so inhibit milk ejection.

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| Residual milk amounts will be inversely proportional to the strength of the stimuli signals. Develop a regular and repetitive milking routine. Make changes gently and carefully. Milk quickly and quietly in a stress-free environment. |

**Milking routines**

The aim of an efficient and effective milking routine is to leave the least amount of residual milk in the udder. This, in itself, is a measure of good stockmanship. Milk ejection can be stimulated manually by a series of activities carried out by the person doing the milking. The amount of residual milk is inversely proportional to the strength of the conditioned stimuli signals, which are developed into a regular, repetitive milking routine, including such activities as feeding and udder preparation. The stimulation response is transitory, the maximum effect declining within a few minutes of milk ejection occuring. Therefore delayed milking will reduce the amount of milk removed. The internal pressure of milk within the udder peaks between one and two minutes after milk ejection and therefore milking should be completed as soon as possible after this occurs. Cows are creatures of habit and consequently changes to the routine should be made gently and quietly. It is important to avoid any circumstances which upset or frighten them causing the release of adrenalin which adversely affects the circulatory and musculatory systems, thus restricting effective milk ejection and prolonging the duration of milking. The response of cows and those milking them to a pleasant and stress free environment will be measured in terms of production levels.

Because residual milk and strippings have fat percentages that normally exceed 10%, incomplete or slow milking can reduce markedly the fat content of the milk at any particular milking. However, it is important to recognise that milk fat retained or left in the udder is not lost but will be obtained at succeeding milkings. In fact, although management factors (eg. varying milking intervals and milking frequency) may alter the fat content of milk at one milking, the average fat content over a period of time will be unaffected. On average, the fat content of milk obtained must be the same as that secreted into the udder. The concentrations of protein, lactose and other solids-not-fat are unaffected by changes in milking management either at one or more milkings.

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| HAND MILK with clean, dry hands. Use the full hand and avoid finger and thumb stripping.   |  | | --- | | MACHINE MILKING will create a pleasant sensation for the cows if the machine is kept clean, maintained properly and operated according to the manufacturer's instructions. Attach and remove clusters carefully to avoid vacuum fluctuations which cause mastitis. Readjust slipping teatcups and replace fallen clusters immediately.  **Milking methods**  Hand milking should always be done using clean, dry hands. Preferably, milk with the full hand and avoid end-of-milking stripping with the finger and thumb. Rear quarters should be milked first as they contain most milk and the milking bucket hooded to reduce contamination from dust and udder hairs.  Methods of machine milking are designed to create a pleasant milking sensation for the cows and to avoid any possible hazard to udder health. It is most important that milking is done with a well designed, carefully cleaned and properly maintained machine which is operated strictly according to the manufacturer's instructions.  A skilled operator pays particular attention to careful cluster attachment and removal from the udder. During cluster attachment it is essential to ensure that the vacuum cut-off arrangements to the clawpiece are effective so that excessive volumes of air do not enter and cause vacuum fluctuations in the main vacuum pipeline system, as this could increase mastitis incidence. Attach each teatcup carefully starting with the two furthest from the operator. The clusters are removed as soon as milk flow ceases, avoiding excessive air entry through the teatcups by cutting off the vacuum supply before gently but firmly pulling the teatcups from the udder. During milking, any teatcups which slip from the teats should be readjusted immediately and any clusters which fall to the floor should be cleaned and reattached without delay. | |