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# Some Observations on the Nature of the Milk Let-down Mechanism in the Cow

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**T**HE following is a summary of a paper read to the New Zealand Society of Animal Production at its annual meeting, 1948. The full paper will be published in the New Zealand Journal of Science and Technology.

The phenomenon of the "strippy" cow, i.e. the cow which requires hand milking following machine milking, is well known to dairy farmers. The only definite explanation so far offered for this phenomenon is that of Peterson (1), who regards the tendency for the teat cups of the milking machine to "crawl" up the teats closing the "annular fold" as the reason why the cow may not milk out completely to the machine. Simple pulling downwards on the cup at the end of milking will enable the machine to receive the residue of milk trapped in the milk cistern. We have confirmed this phenomenon and find it to be associated with relatively small amounts of milk (less than one pound at a milking). The following results are presented as evidence that in some cases "strippings" may be due to a further letting down of milk following an inadequate first stimulus.

Miller and Petersen (2) show that a cow stimulated 20 minutes before milking declines in production. Knodt and others (3), did not find this to be so. We believe the explanation of the contradiction lies in the fact that Knodt's cows probably let down their milk again to the stimulus of the machine. Using two cows milked two quarters at a time so that each cow was its own "control" we have shown that with a 12 or an 18 minute period between the commencement of the two milkings there is a decline in milk yield if the cow is not restimulated prior to the second milking. Restimulation results in the yield from the second quarters being normal at the second milking and a slight increase in milking rate is detectable. These experiments support the view that restimulation results in a second out-flow of the milk let down hormone from the posterior pituitary gland.

Cows trained to a double milking procedure were milked four quarters at a time and milk ejection curves plotted for two milkings 18 minutes apart. Following a normal start the first let-down was inhibited to varying degrees by electric shocks. The experiment showed a decline in milk weight and rate of milking for the first milking after increasing electric shock with the opposite trend in the second milk flow curve. This means that the amount of milk drawn at a second milking is an inverse function of the efficiency of the let-down reflex prior to the milking procedure.

Further inhibition experiments suggest the possibility that the efficiency of the inhibition is due to the partial blocking of the reflex—an inhibition due to an extraneous stimulus—rather than an effect due to a rise in the adrenalin level of the blood. This however, is not definite. Vigorous "machine stripping" was shown to stimulate the cow. The cows used in the experiment tended to become natural "double milkers". One became normal on being put back to a normal schedule. The other responded only after the application of a hot water wash prior to milking.

The above experiments demonstrate the possibility that the cow which yields much milk as strippings is really one which has failed to respond to the milking preliminaries with an adequate reflex secretion of pituitary hormone. On being stripped there is a second response by the pituitary body and, as milking has been incomplete, more milk

is obtained. Vigorous machine stripping can produce the same result. Hence a truly "non-stripping" schedule requires an adequate starting stimulus. The only post milking treatment recommended is a brief pull-down on the cups to withdraw any milk left due to "crawling." Vigorous machine stripping should be avoided.

**References:**

- (1) Peterson, Journal Dairy Science (1944) XXVII. (6)433.
  - (2) Miller and Petersen, Journal Dairy Science (1941) XXIV (3)225.
  - (3) Knodt, Reid, Williams and Kesler, Journal Dairy Science (1947) XXX (8)580.
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## Discussion on Mr. Whittleston's Paper

PROF. CAMPBELL: I would like Mr. Whittleston to express an opinion on the following points. At the institute, we have had trouble in the hot weather with biting flies in the milking shed upsetting milking procedure and in one or two small trials we have used D.D.T. spread not only on the shed itself but on the cows using a water suspension of D.D.T. We did have some success in keeping down the fly trouble. Has Mr. Whittleston any experience in the use of D.D.T. in the shed? We also noticed that hot water did have some effect in restoring the normal milk ejection curve after it had been disturbed by displeasing experiences during the preceding milkings. Is the use of hot water in the sheds preparatory to milking worth-while in normal milking practice?

MR. WHITTLESTON: We have had no experience with D.D.T. but we tried a dimethyl phthalate spray. Unfortunately, it was not available till the end of the season and we could not give it a fair trial. It was applied to the legs of the cows but, we only tried it once or twice before the rain came. I think it would be better than D.D.T. because it is a repellent. Hot water has no significant effect on the milking rate of cows under ordinary conditions and by hot I mean 55-60 degrees centigrade. Warm water, 35 to 40 degrees centigrade, has no effect either. These experiments were run over three weeks in the first case and six weeks in the second and no effect was obtained.

MR. LONG: I would like to make a couple of observations. One is regarding the psychology of cows. I am one of the mean farmers who goes for the last little bit and we have always stripped. This is the first season I have fed dairy meal to the cows and they are very fond of it. We have noted the marked reduction in the strippings while we are feeding meal. I have noticed repeatedly that the off-spring from different bulls have totally different habits in the shed. Sometimes we find a whole line of heifers from one bull, seems quite incapable of letting the milk down and we have to strip them thoroughly. In another case we can handle them quite easily.

MR. WHITTLESTON: Petersen has published a short paper describing some cows from one bull and all had to be milked with special treatment. He believes milking ability is inherited. The point about meal feeding; I should think it very likely, with the pleasant association, to have been a conditioned reflex.

MR. ROACH: Under New Zealand conditions it is not usual to give the cow anything to eat while waiting in the bail and it is not unusual for the animal to have certain unpleasant experiences. I have often wondered whether, it is possible, in the course of the season that the animals develop a reflex almost comparable to Mr. Whittleston's electric shock, in other words a dislike of the bail and when feed is being fed they develop a liking of the bail.