

Functions of Vacuum

- Offset the forces of gravity
- Seals liner on the teat
- Withdraws milk from the cow
- Provide pulsation
 - Open liner
 - Close liner
- Transport milk in hoses

Low Vacuum

- Liner slips increase (15 vs. 13 inHg.)
- Major vacuum fluctuations increase.
- Unit falloffs increase
- Milking time increases
- Milk yield may decrease

Spencer & Rogers, 1990, JDS 74:429.

ISO Requirements for Pulsators

- The 'b' phase shall be a minimum of 30% or 300 milliseconds.
- Vacuum drop during the 'b' phase shall not exceed 1.18 inHg. (4 kPa).
- The 'd' phase shall be 15% or more and/or 150 ms or more.
- The pulsation rate varies between 45 to 70 cpm; 60 cpm is the usual rate. Rate shall not vary more than +/- 3 cpm.

Ratio

Definition: The ratio of increasing and maximum phases (a+b), the decreasing and minimum vacuum phases (c+d); Pulsator ratio = (a+b):(c+d).

'a' : Increasing vacuum phase (opening phase).

'b' : Maximum vacuum phase (open phase).

'c' : Decreasing vacuum phase (closing phase).

'd' : Minimum vacuum phase (closed phase).

Effects of vacuum on milking

N = 147 cows (5292 observations) DeLaval WC01

Vacuum (inHg.)	Yield, (lb)/milking	Duration Minutes	Peak Flow lb/min	Avg. Flow lb/min
12.5	36.9	5.38 ^a	8.88 ^a	7.21 ^a
13.5	37.1	5.11 ^b	9.41 ^b	7.52 ^b
14.5	37.2	4.85 ^c	10.01 ^c	8.02 ^c

P<.05 Adjustments sig. @ 14inHg.; Kickoffs - ns

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Effect of Vacuum and Ratio on Avg. Machine on Time (Duration)

Ratio \ Vacuum inHg	60:40	65:35	70:30
12.5	5.55	5.36	5.25
13.5	5.31	5.02	5.01
14.5	5.12	4.79	4.65

(Minutes per milking)

Effect of Vacuum and Ratio on Avg. Flow

Ratio \ Vacuum inHg	60:40	65:35	70:30
12.5	6.98	7.36	7.33
13.5	7.28	7.50	7.78
14.5	7.66	8.09	8.31

(Pounds per Minute)

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Effect of Vacuum and Ratio on Peak Flow (pounds per min)

Ratio \ Vacuum inHg	60:40	65:35	70:30
12.5	8.50	9.11	9.03
13.5	8.94	9.60	9.72
14.5	9.40	10.17	10.45

$P < .05$ Range of SE: 0.025 - 0.052

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