

Timing of AI Relative to Estrus and Ovulation
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The a.m./p.m. Rule

Research conducted in the 1940's indicated that the optimal time of breeding occurred about 6 to 12 hours after the onset of estrus (Table 1). Unfortunately, these data were never statistically analyzed and suffered from too few cows per treatment group for valid comparisons. Based on the data in Table 1, dairy producers were instructed to breed cows first detected in estrus in the morning (i.e. the a.m.) later that day (i.e., the p.m.), whereas cows first detected in estrus in the evening (i.e., the p.m.) should be bred the next morning (i.e., the a.m.). This method subsequently was termed the a.m./p.m. rule, and many dairy producers continue to breed their cows accordingly.

Table 1. Effect of time of AI on fertility of beef cows (Trimberger and Davis, 1943)

Time of AI	Number of Breedings	Conception Rate (%)
Start of Estrus	25	44
Middle of Estrus	40	82
End of Estrus	40	75
Hours After the End of Estrus		
6	40	36
12	25	32
18	25	28
24	25	12
36	25	8
48	25	0

Once-Daily AI vs. the a.m./p.m. Rule

Despite widespread use of the a.m./p.m. rule, many studies have shown that once-daily AI results in conception rates similar to that of using the a.m./p.m. rule (Tables 2, 3, and 4). These results agree with a previous recommendation that a single mid-morning AI for all cows detected in estrus the night before or the same morning should result in near optimal conception rates (Foote, 1979).

Table 2. Effect of once-daily AI versus the a.m./p.m. rule on 75 d nonreturn rate in lactating dairy cows (Nebel et al., 1994)

Treatment	Number of Breedings	Nonreturn Rate (%)
a.m./p.m. Rule	3659	60.1
Once-Daily	3581	60.6

Table 3. Effect of once-daily AI (0800 to 0900 h) versus the a.m./p.m. rule on conception rate in dairy heifers (Gonzalez et al., 1985)

Treatment	Number of Breedings	Conception Rate (%)
a.m./p.m. Rule	132	62.9
Once-Daily	129	62.0

Table 4. Effect of once-daily AI (0800 to 1200 h) versus the a.m./p.m. rule on conception rate in lactating Jersey cows (Graves et al., 1997)

Treatment	Number of Breedings	Conception Rate (%)
a.m./p.m. Rule	172	60.5
Once-Daily	165	57.6

Timing of AI Relative to Estrus

Timing of AI in relation to first detection of estrus behavior can affect subsequent conception rates (Tables 5 and 6). Although the conception rate was statistically lower for cows in the a.m. - a.m. group (Table 6), this difference would not likely be noticeable under most field conditions because cows rarely are first detected in estrus at the onset of estrus (Nebel et al., 1994).

Table 5. Effect of time of AI relative to onset of estrus on 75 d nonreturn rates in lactating dairy cows (Nebel et al., 1994)

Interval (h)	Number of Breedings	75 d Nonreturn Rate (%)
0 - 6	1126	59.9 ^a
6 - 12	2352	60.7 ^a
12 - 18	2455	55.5 ^b
18 - 24	962	53.4 ^{b,c}
24 - 30	99	49.6 ^c

^{a,b}Means with different superscripts differ ($0.05 < p < 0.1$)

Table 6. Effect of time of AI relative to onset of estrus on conception rates in lactating Jersey cows (Graves et al., 1997)

Estrus - AI	Number of Breedings	Conception Rate (%)
a.m. - a.m.	112	51.8 ^a
a.m. - p.m.	109	59.6 ^b
p.m. - a.m.	116	65.5 ^b

^{a,b}Least square means (LSM) with different superscripts differ ($0.05 < p < 0.1$)

Timing of AI Relative to Ovulation

Research using Ovsynch in lactating dairy cows indicates that there is a 0 to 24 h window in which to conduct AI in relation to ovulation (Table 7)

Table 7. Effect of time of AI in relation to the second GnRH injection of Ovsynch on conception rate in lactating dairy cows (Pursley et al., In press)

Time from GnRH (h)	0	8	16	24	32
# of cows	149	148	149	143	143
Conception Rate (%)	37 ^a	41 ^a	45 ^a	41 ^a	32 ^b
Calving Rate (%)	32 ^a	34 ^a	36 ^a	32 ^a	23 ^b

^{a,b}Means with different superscripts differ ($p < 0.05$)

One vs. Two AI Breedings

Finally, once-daily AI results in similar conception rates to twice-daily AI (Table 8). Several other studies agree with these data (Gonzalez et al., 1985; Nebel et al., 1994).

Table 8. Conception rate of dairy heifers receiving one AI service at onset of estrus (One AI) or one AI service at the onset of estrus and another 12 h later (Two AI; Wahome et al., 1985)

Treatment	Number of Breedings	Conception Rate (%)
One AI	84	70.2
Two AI	86	68.6

Conclusion

- A single mid-morning AI for all cows and heifers detected in estrus the night before or the same morning should result in near maximal conception rates and is an effective alternative to using the a.m./p.m. rule to manage AI

References

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