



Dispelling the Myths of Artificial Insemination

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There always seems to be new tricks to improve dairy cattle conception rates, and considering the low rates in many herds, it is no surprise that producers have opted to incorporate these tricks into their reproductive programs. However, not all new techniques are beneficial to herd reproduction. In fact, some suggestions may actually detract from reproductive performance. Although producers should always be open to improved ways to get cows pregnant, they should verify that the suggestions are validated through solid research before changing their protocols.

Below are ten commonly believed myths and the corresponding correct procedures. These fundamentals should help you outline a proper A.I. management program and protect against incorporating harmful A.I. techniques.

1. Myth: *Transfer of semen is not time dependent*

• **Correct Procedure:** Make all semen transfers between nitrogen tanks or retrieval of semen from a nitrogen tank within 10 seconds or within 5 seconds if extreme heat or high winds are present. This time range will keep sperm within a safe temperature range.

2. Myth: *Thawing procedures are not critical as long as semen is thawed.*

• **Correct Procedure:** Thaw semen in 95 to 98°F (35 to 37°C) water for 30 seconds. Fertility comparisons show an advantage for semen thawed in warm water. (Table 1)

3. Myth: *Shaking the straw to move all semen away from the end of the straw that is going to be cut damages sperm cells.*

• **Correct Procedure:** Move the air bubble to the end of the straw before cutting. This will not damage sperm, and if the semen is not moved away from the end that is to be cut, 1 to 5% of the sperm will be lost.

4. Myth: *Changes in temperature after semen has been thawed are not important.*

• **Correct Procedure:** Protect semen from environmental changes while loading into insemination equipment and transferring to the cow. Failure to protect sperm can either cause cold shock or heat stress, both of which will result in lowered fertility.

5. Myth: *Fertility of thawed semen is not dependent on insemination time.*

• **Correct Procedure:** Inseminate semen as soon as possible after warm water thawing, but within 15 minutes. Higher fertility can be obtained by thawing semen in warm water (See Correct Procedure # 2) if the semen is placed quickly into the reproductive tract of the cow. Sperm deteriorate rapidly outside of the reproductive tract and by 15 minutes after thawing the advantage of warm water thawing has been lost. (Figure 1)

6. Myth: *Semen stored under liquid nitrogen is better than semen stored in liquid nitrogen vapors.*

• **Correct Procedure:** An on-farm semen nitrogen tank must contain liquid nitrogen, but the level of nitrogen is not important. Today the on-farm semen nitrogen tank is so well insulated that the differences in temperature between semen stored directly in liquid nitrogen and semen stored in vapor at the top of tank is only a few degrees. No difference in semen quality can be detected at these storage conditions.

7. Myth: *Semen stored in plastic goblet on racks has higher seminal quality.*

• **Correct Procedure:** Use of either a plastic goblet or the ABS metal rack will provide adequate protection during storage and handling because semen in either rack system has a good margin of safety when transferred within 10 seconds (See Correct Procedure #1). The metal rack does have three advantages over the goblet rack type. There is less use of nitrogen during transfer and retrieval, elimination of potential handling errors because semen can be placed



Semen transfer from nitrogen tank to water bath.

EFFECT OF THAWING TEMPERATURE OF SEMEN UPON FERTILITY

Thaw Water Temperature	Number of First Services	%90-Day NR
Iced	5349	65.0
Ambient	5227	66.0
35°-37°C	5308	69.6

Table 1: Effect of Thawing Temperature of Semen upon Fertility.⁵



Proper straw cutting.



Loaded insemination guns are protected in coversalls.



Semen in tank neck

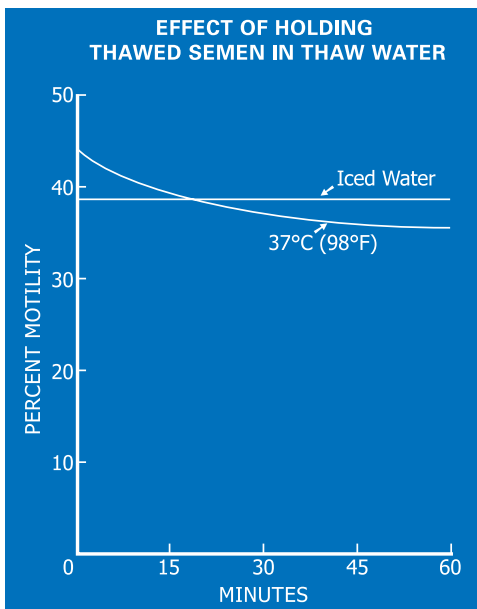


Figure 1: Effect of holding thawed semen in thaw water. (Based on ABS internal research)

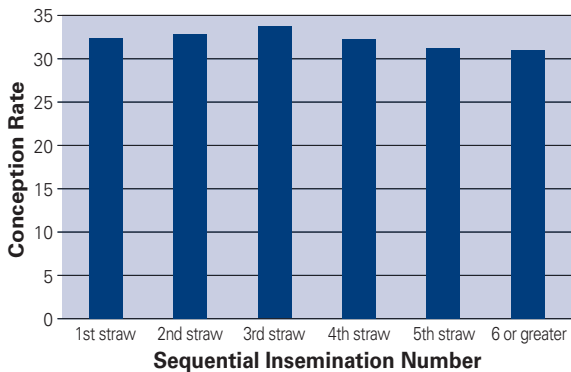


Figure 2: Conception Rates by Sequential Insemination Number (From Over 8,000 Inseminations)^{3,6}

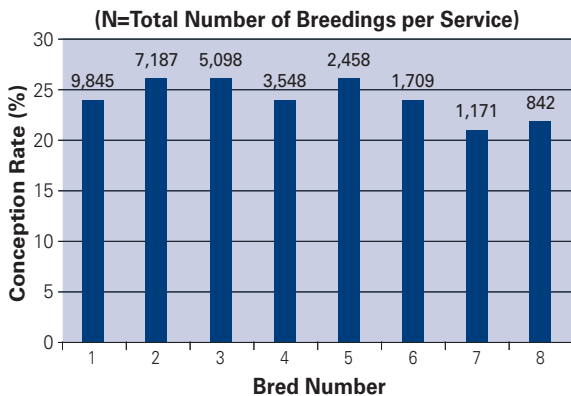


Figure 3: Average Large Herd Conception Rate by Times Bred. (Dairy Comp 305 data from 4 large dairies.)

Number of Inseminations	95% Confidence Interval*
10	±29.0
50	±13.0
100	±9.2
300	±5.3
500	±4.1
1000	±2.9
5000	±1.3
10000	±0.9

*The values assume that all of the error variance is due to binomial distribution

Figure 4: How numbers of inseminations affect fertility estimation.

into these racks prior to freezing and no loss of semen from knocked off plastic goblets.

8. Myth: Never thaw more than 2 units of semen at one time.

•**Correct Procedure:** Thaw only the number of units of semen that can be placed in the reproductive tract within 15 minutes. The advantage of warm water thawing exists for up to 15 minutes (See Correct Procedure #5). The actual limit is not the number of units of semen to thaw, but instead the capability of the inseminator as well as the impacts of the facility. Early reports² had shown a dramatic decrease in conception when thawing more than 2 units of semen. Upon further review, this early study lacked enough numbers to obtain useful statistical information and may have been impacted by ambient temperature/humidity. More recent work³ with over 14,000 inseminations on multiple sites has shown no statistical difference if semen is placed in the reproductive tract within 15 minutes.

9. Myth: Switching to unproven or less expensive semen on "problem breeders" is justified after 3 services.

•**Correct Procedure:** Continue to breed animals with proven A.I. sires until the animal is added to the cull list. The chances of an animal becoming pregnant is approximately the same after many services, excluding a small percent of pathological "problem cows" or long lactation stale cows. This consistent fertility can be seen in herds where many inseminations are available and no bias is introduced on whether to breed an animal in heat or what type of semen is used in breeding. In reality, most "problem cows" are the result of not getting semen into a cow consistently in the first half of lactation or breeding decision bias described previously. In addition, Progeny Test sires (young sires) have no fertility information available and as a group, have no fertility advantage over proven sires. (Figure 3)

10. Myth: Accurate fertility evaluations can be made using a small number of inseminations.

•**Correct Procedure:** Be cautious when evaluating sires, breeding protocols or technicians by conception rate. Too often producers and their consultants will evaluate a sire or technician with limited data. For example, let's assume a dairy wants to evaluate two breeding technicians for a three month period. Let's assume of course that the technicians are truly breeding similar populations of cows in respect to age, days in milk, production, etc. If technician A has 300 breedings for this 3 month period and a conception rate of 35%, you can be 95% confident that this technician's True conception rate is between 29.7% and 40.3%. In the same three months technician B has 300 breedings and a 30% conception rate. Likewise you are 95% confident that B's true conception rate is somewhere between 24.7% and 35.3%. These technicians are not different, even with 300 breedings. This example shows there is not enough data to accurately detect a difference between these two technicians. Decisions made on misleading data can cost you money. (Figure 4)

Even though there seem to be many new ways to improve conception rate on a dairy, not all of them will have a positive impact on reproductive performance. When evaluating these new techniques, it is important to keep in mind that the fundamentals of proper A.I. management, like proper handling and use of frozen semen, do impact reproductive performance. Use of good fundamentals such as the ones detailed in this article, can help ensure optimal reproductive performance on any dairy.

References:

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