

Factors Influencing the Ai Success Rate with Fresh Semen in Tunisian Arab Mares

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Abstract: The aim of this study was to determine the influence of time interval between semen collection and artificial insemination (AI) and the number of spermatozoa in AI doses, on the AI success rate in Tunisian Arabian mares. A total of 79 AI with fresh semen was used on 56 mares (age 4-9 years, n = 34; age 10-20 years, n = 22). The AI success rate was defined as the number of pregnant mares divided by the number of inseminated mares and it was determined for the time intervals: 0-10, 10-20 and 20-30 minutes after semen collection. Doses of AI containing 2 or 3 billions of spermatozoa with fresh raw semen (n = 34), or with fresh semen extended with a semi skimmed milk (n = 45) were used. The AI success rate was determined with the raw and the extended fresh semen. Results showed that the AI success rate decreased with the time interval ($p < 0.05$). There was no difference between AI success rates founded in raw and extended semen with the AI doses of 2 or 3 billions of spermatozoa. This study showed that the AI success rate was affected by the time interval between semen collection and AI. It was recommend to practice AI in Arab mares with fresh semen in the time interval 0-10 after semen collection.

Key words: Time interval % AI success rate % Sperm number % Arab mares

INTRODUCTION

Actually, AI with fresh semen is the most practised by Tunisian farmers to inseminate their Arab mares. Fresh semen is regularly used immediately within the 30 minutes after collection [1, 2]. Many factors could affect the success rate of AI with fresh semen in mares. For this reason and using Tunisian Arab mares, we propose to study some factors that can affect the AI success rate in Tunisian Arab mares in particular the time interval between semen collection and the AI of the mare and the number of spermatozoa per AI dose.

MATERIAL AND METHODS

General: The experiment took place in the stud farm of Sidi Thabet, situated in the north of Tunisia at 36° 54' 35. 16'' N, 10° 02' 31. 94'' E. Ejaculates were collected every 48 hours from one stallion using a Missouri artificial vagina and an estrus mare. Collections of ejaculates were done during the official breeding season starting from 15 February to 15 June 2007.

Semen Evaluation: After collection the ejaculate was filtered with a suitable filter to remove the gel fraction. Thereafter, the volume of sperm was directly estimated by reading the graduated vial. The percentage of motile spermatozoa in the raw semen was determined using a phase-contrast microscope. Only ejaculates that presented a percentage of motile spermatozoa \$ 70 % and sperm concentration \$ 120 10⁶ spermatozoa were used in AI (Table 1) [3]. The sperm concentration (10⁶ spermatozoa /ml) was determined using a Thoma cell chamber after 1:40 dilution of raw semen using formaldehyde (1.85 %).

When it was necessary, semen was extended in a half skim milk UHT with a dilution rate of 1/3 semen and 2/3 extender.

A total number of 79 AI was carried on 56 Arab mares (age 4 to 9 years, n = 34; age 10 to 20 years, n = 22). Inseminations were carried on mares when the diameter of preovulatory follicle reached 35 mm. The preovulatory follicle diameter was determined by an ultrasonography (ALOKA) with a linear probe of 5 MHz.

Table 1: Characteristics of selected sperm for AI of mares

	Number of collected ejaculates	Sperm volume (ml)	Percentage of motile spermatozoa (%)	Sperm concentration (10 ⁶ spermatozoa /ml)
Means	35	48	80	289
Std		11.4	4.6	80

Determination of AI doses and time between semen collection-AI:

AI doses were prepared according to the method of Haras Nationaux [2]. The number of spermatozoa in AI doses was 2 or 3 billions when we used in raw semen (n AI = 34) and in extended semen (n AI = 45). The volume of each AI dose was 10 ml in raw or in extended semen.

Time between semen collection and the AI of each mare was determined using a timer. Three time intervals have been adopted: mares inseminated during 0-10, 10-20 and 20-30 minutes after semen collection. Then, the AI success rate was determined in each time intervals. The AI success rate was defined as the number of pregnant mares divided by the number of inseminated mares.

Statistical Analysis: Statistical analysis was carried using a software SAS (version 1994). ANOVA was carried to compare AI success rate in the three time intervals and in the raw and extended semen. The threshold of significance was 5 %.

RESULTS AND DISCUSSION

Our results showed that the AI success rate was decreased during the 30 minutes after collection. The AI success rate was higher for mares inseminated during 0-10 minutes than those inseminated during 10-20 minutes or 20-30 minutes after semen collection (Figure 1) (62 vs. 47 and 17 %) ($p < 0.05$). Magistrini [1] and Vidament *et al.* [4] reported 53 % of fertility per cycle in French studs when the AI with fresh extended semen was performed 30 minutes following semen collection. Baril *et al.* [5] found that 60 % of the conception rate in sheep was achieved when the AI was immediately after semen collection. In our study using Arab mares and under Tunisian conditions, we showed that it is better to inseminate mares with fresh semen in the 10 minutes following semen collection.

The AI success rate was not affected either by the sperm number or the semen type (raw or extended semen,

Table 2). In fact, AI success rates were not different when we used doses of 2 or 3 billions spermatozoa in raw semen and extended semen. Magistrini [1] and Vidament *et al.* [4] showed in their studies that AI doses containing 200 10⁶ spermatozoa allowed a good fertility per cycle. Besides, Sieme *et al.* [6] showed that there was no difference between sperm insemination doses of 50 or 300 millions with fresh semen on the fertility of mares. Morris and Allen [7] reported that low insemination dose of fresh semen gave a satisfactory conception rate in mares. However, Metcalf [8] reported that a minimum of 500 millions of progressively motile sperm of extended fresh semen increase the pregnancy rate in mares. In our study and under Tunisian conditions, it is possible to use AI with either raw or extended fresh semen with doses which contain 2 billions spermatozoa.

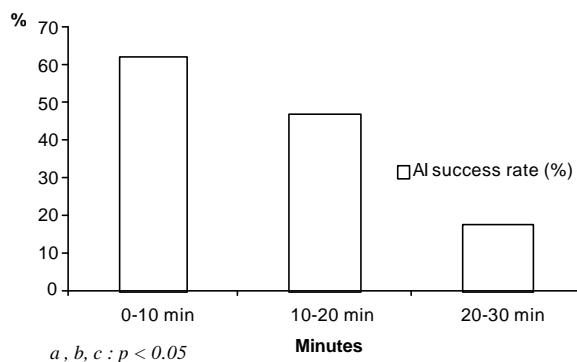


Fig. 1: AI success rate during time intervals after collection

CONCLUSION

It was concluded that fresh semen should be used in Tunisian Arab mares within the 10 minutes following semen collection, in order to obtain high AI success rates. Also, low doses of fresh semen could be used in AI in order to increase the number of inseminated mares.

Table 2: AI success rate in raw and extended fresh semen

	In raw semen (n IA = 34)		In diluted semen (n IA = 45)	
	2 billions of spermatozoa /AI dose	3 billions of spermatozoa /AI dose	2 billions of spermatozoa /AI dose	3 billions of spermatozoa /AI dose
AI success rate (%)	55	52	50	55

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