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# Determination of first ovulation time in Azerbaijan brood mares

**Mosaferi, S.** [1*]**, Jafarzade, S.** [3]**, Ostadi, Z.** [2]**, Farhodi, H.** [3]**, Davasaztabrizi, A.**[1]

[1]*Department of Clinical Sciences, Faculty of Veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran*
[2]*Department of Anesthesiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran*
[3]*Department of Veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran*

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**ABSTRACT**

*Plasma steroid evaluations are well established approaches for monitoring reproductive function in mares. The purpose of this study was to detect the first ovulation time by the estimation of progesterone and estradiol-17β profiles in plasma samples of Azerbaijan Arabian brood mares. Eight seasonally an ovulatory light horse mares were selected from Tabriz horse stable and blood samples were obtained every week for progesterone and estrogen determination. Chemiluninescence immunoassay was used as the method for progesterone and estrogen concentration measuring. After six weeks sampling (start from 12$^{Th}$ of January), in seventh week (23$^{Th}$ of February), estradiol-17β concentration had a significant increasing (P‹0.0001). One week later progesterone concentration increased too (P‹0.0001). In conclusion, both $p_4$ and E1-17β in plasma analysis have a predictive value for assessment of ovulation time in brood mares and the first ovulation time in Azerbaijan brood mares start from beginning of the march.*

**Key words: mare**, ovulation, progesterone, esteradiol-17β.

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## INTRODUCTION

Determination of the reproductive status is one of the most important factors for effective management and efforts to use assisted reproductive techniques depend on the knowledge of the basic reproductive physiology of a given species [16].The mare is a seasonally polyestrous animal . Reproductive activity is regulated primarily by photoperiod but also by nutrition and climate (principally temperature) [8].In the temperate climate zones around the world, the majority of the mare undergo cyclic sexual activity during the spring and summer (breeding season), and only a few mares are reproductive active during the late fall and winter (anestrus season). With the increase in day length in early spring, ovulation activity is gradually stimulated. During the spring transition from anestrus to the breeding season, follicular development may be irregular with follicles developing and regressing for some time (weeks to months) [8].Eventually, follicular development culminates in the first ovulation of season. Following this, mares generally continue to have regular ovulatory cycles. The percentage of mares that ovulate decrease gradually during the fall and only a small percentage of mares will continue to ovulate throughout the winter.

Several studies had been made to determine ovulation time in mares including the clinical and ultrasonographical examinations [17,18,20]. Ovulation was also predicated on estrus mares by serial measurements of peripheral

estrogens and progesterone concentrations [3]. The maximum diameter of the follicle in mare was determined by detection of conjugated estrogen in blood [13]: also, they estimated serum progesterone before ovulation.

Meanwhile, Naber et al (1999) detected the blood steroid of pregnancy (early and late gestation) in Arabian mares [14].

The growth of the dominant follicle was associated with certain intera-follicular E1-17β and $P_4$ levels in mares [7].Ovarian activity of cyclic mares was monitored by measurement of $P_4$ and E1-17β in plasma [20] and in follicular [4] in transitional period of mares. The ovarian endocrine activity in the mare can be evaluated through the use of fecal steroids or their metabolites [3]. Estrogens are end products of steroid metabolism and, therefore, the compounds in plasma and faces are similar [16]. The fecal estrogens in relation to reproductive status in mare were demonstrated by Bamberg [2]. They were also demonstrated in cows [1], in buffaloes [12], and also in primates [11].

The aim of this study is confirmation of the first ovulation time in mares by determination of $P_4$ and oestradiol-17β levels in blood.

## MATERIALS AND METHODS

Starting from $12^{th}$ of January, eight Arabian brood mares at Tabriz horse stable were placed on a regimen of once-weekly jugular blood sampling for progesterone and estrogen determination. Measuring the progesterone and estrogen was done by chemiluminescence immunoassay method. Chemiluminescence immunoassay is now established as one of the best alternatives to conventional radioimmunoassay for the quantitation of low concentrations of analyses in complex samples. During the last two decades the technology has evolved into analytical procedures whose performance far exceeds that of immunoassays based on the use of radioactive labels. Without the constraints of radioactivity ,the scope of this type of analytical procedure has widened beyond the confines of the specialist clinical chemistry laboratory to other disciplines such as microbiology ,veterinary medicine, agriculture, food and environmental, testing. State-of-the-art chemiluminescence immunoassay systems are covered in detail together with those systems which are commercially available.

Solid-phase chemiluminescence immunoassay for progesterone and estrogen in 10 microliter of un extracted serum was used. Danazol at ph 8.0 is included (100 ng per tube) to displace progesterone and estrogen from binding proteins in serum. For each hormone there is a conjugate that series as the chemiluminescent ligand marker and homologous ant progesterone IgG covalently coupled to "Immunobeads" is the immunoadsorbant. After the binding reaction, bound and free ligands are separated by centrifugation and the chemiluminescence yield of the bound label is determined. The sensitivity, specificity, precision, and accuracy of the method are similar to those of a conventional radio ligand of triturated progesterone and estrogen and serum extraction are used.

Differences between comparable groups were demonstrated with ANOVA test and all computations were done using a personal computer.

## RESULTS

The plasma progesterone and estradiol-17β levels during the 9 weeks sampling period are shown in figure 1 and 2. The mean estrogens in serum samples of assign mares started to increase from beginning of February (this may be indicated that the beginning of transitional period) and reach to maximum value until the end of this month (this indicated the first ovulation time). Serum concentration of progesterone started to increase from the end of February (this indicated that the formation and growth of corpus luteum) and reach to maximum value at beginning March. There was a significant ($P<0.0001$) increase in the concentration of plasma E1-17β, started from $23^{Th}$ of February. At the next sampling (one week later) progesterone concentration significantly ($p<0.0001$) increased, because of the luteal phase meanwhile the concentration of plasma E1-17β decreased. According to obtained results at the beginning of the March the first ovulation has been detected.

ng/ml

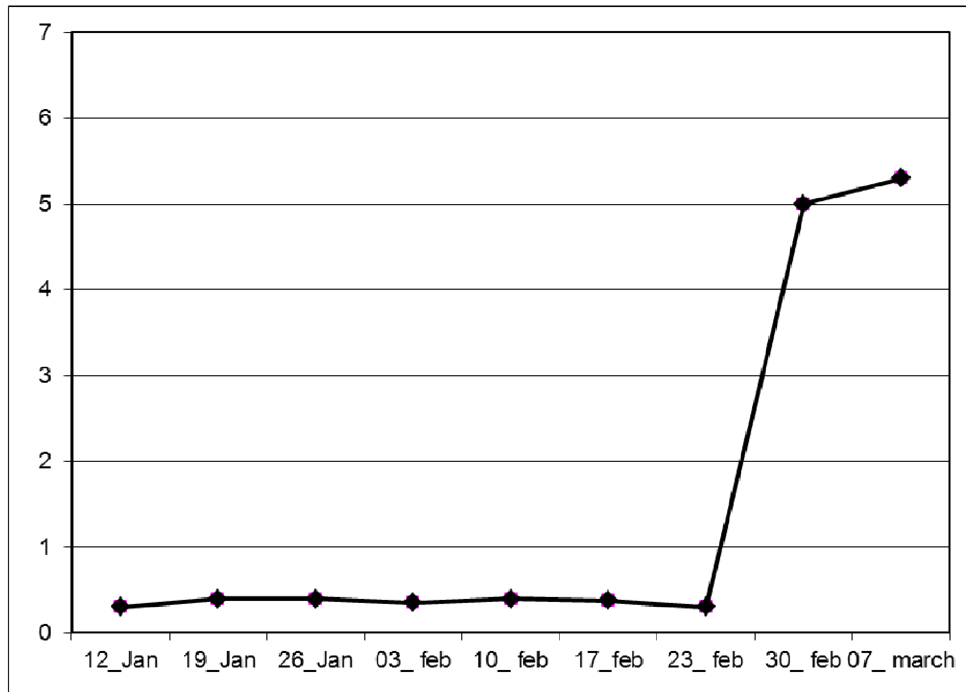


**Figure 1: mean consentration of progestrone**

Pg. /ml

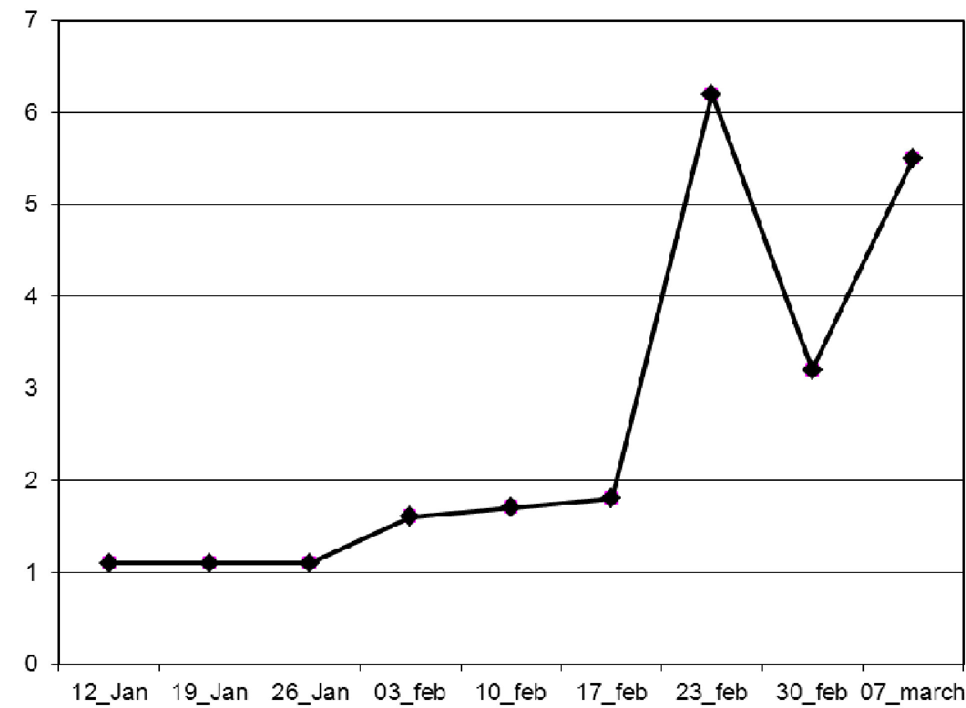


**Figure 2: mean consentration of esterogen**

## DISCUSSION

Hormonal profile is a reliable clinical investigation method of estrus and pregnancy detection using analysis of progesterone and estradiol-17β in mares [15].Meanwhile, the analysis of steroid hormones in plasma and facial samples offer the potential of addressing many timely, integrative problems in reproduction and conservations biology [19]. This research results provide evidence that plasma steroid analysis may be important for understanding the reproductive status in Azerbaijan brood mares. However, the route of excretion of steroid hormones and its metabolites varies considerably among species, and also between steroids within the same species.

In the present study, mean progesterone concentration before and after ovulation was 0.41 ng/ml and 5.17 ng/ml respectively, which confirm reported mean progesterone concentrations in plasma from foaling to foal heat and during estrus, luteal phase and pregnancy (0.51+0.09ng/ml, 0.53+0.08 ng/ml,3.88+0.26ng/ml and 4.22+0.09 ng/ml respectively) by Gunther et al [10].

Also results on 6 Arabian mares shows similarity on mean progesterone concentrations in plasma before and after (6 days) ovulation (<1 ng/ml& 12.70ng/ml respectively) [9].

Blood hormone analysis results indicated a useful characterizing and retrospectively predicting estrus cyclicity and the occurrence of ovulation. Furthermore, cyclicity and ovulation were also confirmed by the rise and fall of the progestagens and E1-17β excretion during the per and post- ovulatory periods [19].

For the study of ovarian activity in mares , several investigators have measured the concentration of p4 in blood [1,5,6].There is agreement that concentrations below 1 ng/ml plasma [8] are indicative for oestrus or missing luteal activity. After ovulation, the values of P4 increase within 24-36 h, and remain high until day 14 or 15. Thereafter, in nonpregnant mares the values decrease rapidly to the low estrus values. The plasma P4 and E1-17β concentrations were similar to those found by others in the late luteal and follicular phases of the estrus cycle of the mare [5,6]. In conclusion, the E1-17β and progesterone metabolites might be more accurate for monitoring the reproductive performance of mares. Subsequently, the ultrasonography accompanied with the estimation of steroid levels in plasma has a predictive value for the assessment of follicular sizes, ovulation time and early pregnancy in Arabian brood mares.

In conclusion results of this study show that the first ovulation time in East Azerbaijan brood mare start from the end of February and this is indicate that estruses that seen after beginning of the March in this area are the best estrus for breeding of mare in the East Azerbaijan.

## REFERENCES

[1] Allen WE, Porter DJ, *Vet Rec*, **1987**, 120, 429-431.
[2] Bamberg E, Choi HS, Möstl E, Wurm W, Lorin D, Arbeiter K, *Equ vet J*, **1984**, 16, 537-539.
[3] Barkhuff V, Carpenter B, Kirkpatrick JF, *J Equ Vet Sci*, **1993**, 13, 80-83.
[4] Bogh IB, Hoier R, Synnestvedt B, Greve T, *Theriogenology*, **2000**, 54(6), 877-888.
[5] Eckersley PD, Harvey MJ, *Vet Rec*, **1987**, 120, 5-8.
[6] Elmore RG, Shull JW, Varner DD, Meyers PJ, *Vet Med*, **1988**, 83, 250-253.
[7] Gerard N, Dduchamp G, Magistrini M, Boyazoglu J, Rafia P, Thomas C, Zjalic M, *Livestock Production Science*, **1999**, 60(2-3), 243-253.
[8] Ginther OJ, *Journal reproduction and fertility supplement*, **1990**, 90, 311-320.
[9] Grovaninajhad S, Kahram H, Khajehgolam H, Mashhory M, *Iran vet*, **2006**, 10(12), 65-71.
[10] Gunther JD, Foley CW, Gaverick HA, Plotka ED, *J Anim Sci*, **1980**, 51, 1131-1138.
[11] Heisterman M, Tari S, Hodges Jk, *J Reprod Fert*, **1993**, 99, 243-251.
[12] Ismail MN. Farrag AA, Mostel E, *Vet Med Ass*, **1987**, 47(3), 643-647.
[13] Koskinen E, Kunts H, lindeberg H, KatiliaT, *Anim Breed Abstar*, **1990**, 58, 47.
[14] Naber Moshe ME, Shemesh M, Shore LS, Rios C, *Israel J Vet Med*, **1999**, 54(2), 33-35.
[15] Schwarzenberger F, Möstl E, Bamberg E, Von Hegel G, *Anim Reprod Sci*, **1992**, 29, 263-273.
[16] Schwarzenberger F, Möstl E, Palme R, Bambergr E, *Anim Reprod Sci*, **1996**, 42, 515-526.
[17] Sevinga M, Schukken YH, Hesselink JW, Jonker FH, *Theriogenology*, **1999**, 52, 585-592.
[18] Townson DH, Ginther OJ, *Anim Reprod Sci*, **1987**, 15, 131-138.

[19] Wasser SK, Monfort SL, wildt DE, *J Reprod Fert*, **1991**, 92, 415423.
[20] Watson ED, Pedersen HG, Thomson SRM, Fraser HM, *Theriogenology*, **2000**, 54(4), 599-609.