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# Baseline serum concentration of gonadotrophin hormones in jennies

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**Abstract**

The study was conducted to determine the baseline serum concentration of gonadotrophin hormones in Jennies. Nine mature Jennies aged between 3 and 5 years and weighing 150-180 kg were used in this study. Blood samples were collected weekly from all Jennies, starting at the first week of November till the last week of January. The serum concentration of FSH and LH were determined by ELISA methods using FSH and LH kits. The results showed that the mean of baseline serum concentration of FSH and LH are 2.90 ± 0.23 and 2.08 ± 0.25 ng/ml, respectively. The higher concentration of FSH was 3.36 ± 0.27 ng/ml which observed at the third week of January and the lower concentration was 2.54 ± 0.24 ng/ml that recorded at the third week of November. While the higher concentration of LH was 2.39 ± 0.48 ng/ml which observed at the third week of December and the lower concentration was 1.56 ± 0.46 ng/ml that recorded at the second week of January. There were no significance differences in serum concentrations of FSH and LH between the weeks, also there was no correlation between the concentrations of both hormones at the duration of the study. Further studies are required to determine the level of FSH and LH at different phases of Jennie's estrus cycle.

***Keywords:*** FSH, LH, Donkey, Jenny.
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# المستوى الاساس لهرمونات القند في إناث الحمير

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**الخلاصة**

اجريت الدراسة لايجاد المستوى الاساس لهرمونات القند في اناث الحمير، حيث استخدم تسعة من اناث الحمير البالغة (اعمارها ٣-٥ سنوات واوزانها ١٥٠-١٨٠ كغم). جمعت عينات الدم من الاناث اسبوعيا ابتداءاً من الاسبوع الاول من شهر تشرين الثاني ولغاية الاسبوع الاخير من شهر كانون الثاني. تم قياس كل من تركيز الهرمون محفز الجريبات والهرمون اللوتيني باستخدام طريقة الاليزا وباستخدام عدة الفحص الخاصة بكل هرمون. بينت النتائج ان المستوى الاساس لكل من الهرمون محفز الجريبات والهرمون اللوتيني لفترة الدراسة ٢.٩٠ ± ٠.٢٣ و ٢.٠٨ ± ٠.٢٥ نانوغرام/مل، على التوالي. لوحظ اعلى مستوى للهرمون محفز الجريبات ٣.٣٦ ± ٠.٢٧ نانوغرام/مل وذلك في الاسبوع الثالث من شهر كانون الثاني، واقل مستوى كان ٢.٥٤ ± ٠.٢٤ نانوغرام/مل والذي سجل في الاسبوع الثالث من شهر تشرين الثاني. بينما كان اعلى مستوى للهرمون اللوتيني ٢.٣٩ ± ٠.٤٨ نانوغرام/مل والذي لوحظ في الاسبوع الثالث من شهر كانون الاول واقل مستوى كان ١.٥٦ ± ٠.٤٦ نانوغرام/مل والذي سجل في الاسبوع الثاني من شهر كانون الثاني. لم يكن هناك اي فروقات معنوية بين تراكيز الهرمون محفز الجريبات والهرمون اللوتيني بين اسابيع الدراسة، كما لم يلاحظ اي ارتباط بين تراكيز كلا الهرمونين على طول مدة الدراسة. المزيد من الدراسات مطلوبة لايجاد مستوى كل من الهرمون محفز الجريبات والهرمون اللوتيني خلال الفترات المختلفة من دورة الشبق في اناث الحمير.

## Introduction

The donkey (*Equus asinus*) has been associated with mankind throughout recorded history. It is still widely used in many parts of the world as guard animals for protecting small ruminants (sheep, goats and llamas), as companion animals (for people, foals, etc.), halter training (calves, foals), work (pack, pulling wagons, plowing, etc.), riding, and shows (1).

The oestrus cycle of animals is regulated by reproductive hormones which include gonadotrophin releasing hormone (GnRH), follicle stimulating hormone (FSH), luteinizing hormone (LH), estrogen, progesterone, oxytocin, inhibin and prostaglandin $F_2\alpha$ (2).

Both FSH and LH, that also called gonadotrophin hormones, are secreted from the anterior pituitary gland under the stimulating effect of GnRH that secreted from the hypothalamus (3). Secretion of FSH and LH is also regulated by the positive and negative feedback mechanisms of other hormones such as estrogen, progesterone and inhibin (2).

In female animals, the function of FSH is stimulate the follicular growth to produce the mature follicle (4), while the functions of LH are ovulation, formation and maintain the corpus leutium (5).

The baseline concentrations of FSH and LH have been measured in female animals such as cows (6,7), ewes (8), bitches (9) and mares (10), but there is no information about the baseline level of these two hormones in Jennies. Therefore, the objective of this study was to determine the baseline concentration of FSH and LH in Jennies.

## Materials and methods

Nine mature Jennies (aged 3-5 years and weighing 150-180 kg) were used in this study. Blood samples were collected from the jugular vein weekly from all Jennies, starting at the first week of November till the last week of January. Serum samples were isolated from blood samples and stored at -20ºC until the time of hormone analysis.

The serum concentration of FSH and LH were determined by ELISA methods using FSH and LH kits (FSH ELISA Kit, 425-300, LH ELISA Kit, 425-300, Monobind Inc, USA). The optical density of samples was obtained using the microplate reader (Universal Microplate Reader-ELx 800, Bio-Tec. Instruments Inc, USA).

One way analysis of variance and Pearson correlation coefficients were applied for statistical analysis of data using SigmaStat (Jandel scientific software V3.1), and $P<0.05$ was considered as statistically significant.

## Results

The standard curves of FSH and LH are presented in Figure 1 and 2, respectively. The regression equation of FSH and LH were $Y=0.0378x–4.2655$ and $Y=0.085x–14.171$, and the correlation coefficients ($r^2$) were 0.9912 and 0.9479, respectively. These curves were applied later as standards to calculate the serum concentration of FSH and LH.

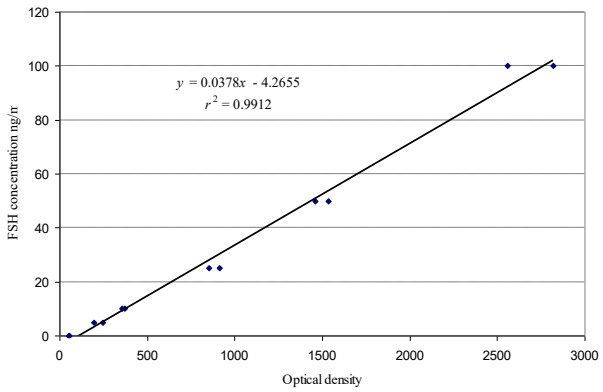


Figure 1: The standard curves of FSH.

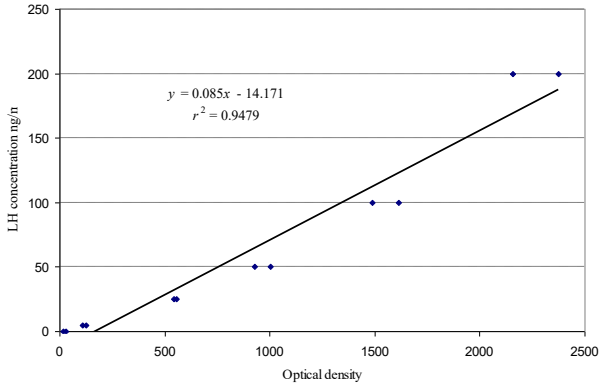


Figure 2: The standard curves of LH.

The mean of baseline serum concentrations of FSH and LH are 2.90 ± 0.23 and 2.08 ± 0.25 ng/ml, respectively (Table 1). The higher concentration of FSH was 3.36 ± 0.27 ng/ml which observed at the third week of January and the lower concentration was 2.54 ± 0.24 ng/ml that recorded at the third week of November. While the higher concentration of LH was 2.39 ± 0.48 ng/ml which observed at the third week of December and the lower concentration was 1.56 ± 0.46 ng/ml that recorded at the second week of January. Statistical analysis shows no significance differences in serum concentrations of FSH and LH between the weeks, also there was no correlation between

the concentrations of both hormones at the duration of the study.

Table 1: Serum concentration (mean ± SD) of FSH and LH in Jennies (n=9), at the period between first week of November and last week of January.

| Months | Weeks | FSH Concentration ng/ml | LH Concentration ng/ml |
|---|---|---|---|
| November | 1 | 2.73 ± 0.26 | 2.06 ± 0.55 |
| | 2 | 2.87 ± 0.51 | 1.97 ± 0.36 |
| | 3 | 2.54 ± 0.24 | 2.16 ± 0.58 |
| | 4 | 3.01 ± 0.99 | 2.06 ± 0.68 |
| December | 5 | 2.79 ± 0.73 | 2.12 ± 0.36 |
| | 6 | 3.04 ± 1.15 | 2.27 ± 0.78 |
| | 7 | 3.03 ± 1.48 | 2.39 ± 0.48 |
| | 8 | 2.77 ± 0.73 | 2.20 ± 1.13 |
| | 9 | 2.73 ± 0.51 | 2.23 ± 0.85 |
| January | 10 | 2.81 ± 0.50 | 1.71 ± 0.30 |
| | 11 | 2.75 ± 0.56 | 1.56 ± 0.46 |
| | 12 | 3.36 ± 0.27 | 2.44 ± 0.85 |
| | 13 | 3.25 ± 1.60 | 1.91 ± 0.11 |
| Mean | | 2.90 ± 0.23 | 2.08 ± 0.25 |

## Discussion

The baseline serum concentrations of Jennie's gonadotrophin hormones were determined between November and January; this period was selected because it located on the anoestrus season of equines (11), and in this period the FSH and LH remain at low concentration (baseline) (12).

In this study the baseline serum concentration of FSH was 2.90 ± 0.23 ng/ml, this level of hormone is lower than the baseline concentration of FSH that recorded in mares (4.5-6.5 ng/ml) (10), ponies (8.34 ng/ml) (13), ewes (6.1 ng/ml) (8) and bitches (4.4 ng/ml) (9). While the concentration of FSH which observed in this study was higher than those that reported in cows (0.72 ng/ml) (6) and rabbits (0.36 ng/ml) (14).

The baseline level of LH that recorded in this study (2.08 ± 0.25 ng/ml) was higher than LH baseline concentration that observed in mares (0.1-0.3 ng/ml) (10), also higher than shown in cows and bitches (0.6-0.7 ng/ml) (7,9,15), but the baseline level of LH which recorded in ponies (5.09 ng/ml) (13) was higher than the level of LH that determined in this study.

There was no significance variation in serum concentration of FSH and LH among the period of study, this indicate that the Jennies have an anoestrus period because the level of these hormones remain at the same level during the anoestrus season (12). Further studies are required to determine the level of FSH and LH at different phases of Jennie's estrus cycle.

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## References

1. Pugh DG. Donkey reproduction. AAEP Proceedings. 2002;48:113-114.
2. Ptaszynska M. Compendium of animal reproduction. 8th ed. Holland: Intervet International bv. 2003: 5-11.
3. Tilbrook AJ, Clarke IJ. Negative feed back regulation of the secretion and action of gonadotropin-releasing hormone in males. Biol Reprod. 2001);64:735-742.
4. Bowen R. Gonadotropins: luteinizing and follicle stimulating hormones. www.arbl/ .cvmbs.colostate.edu/ hbooks/ pathphys/ Endocrine/ hypopit/lhfsh .htm. 2004.
5. Giannios NM. Luteinizing hormone difficiency. www.emedicine.medscape.com/ article/255046-overview. 2008.
6. Mohan M, Rajamahendran R. Effects of unilateral ovariectomy on follicular development and ovulation in cattle. Theriogenology. 1998;49:1059-1070.
7. Padula AM, Borman JM, Wright PJ, Macmillan KL. Restoration of LH output and 17beta-oestradiol responsiveness in acutely ovariectomised Holstein dairy cows pre-treated with a GnRH agonist (deslorelin) for 10 days. Anim Reprod Sci. 2002;70:49-63.
8. Montgomery GW, Martin GB, Blanc MR, Pelletier J. Season influences FSH concentration in ovariectomized Ile-de-France ewes. J Reprod Fertil. 1987;80:271-277.
9. Reichler IM, Pfeiffer E, Piche CA, Jöchle W, Roos M, Hubler M, Arnold S. Changes in plasma gonadotropin concentrations and urethral closure pressure in the bitch during the 12 months following ovariectomy. Theriogenology. 2004;62:1391–1402.
10. Collins SM, Zieba DA, Williams GL. Continuous administration of low-dose GnRH in mares II. Pituitary and ovarian responses to uninterrupted treatment beginning near the autumnal equinox and continuing throughout the anovulatory season. Theriogenology. 2007;68:673–681.
11. Slusher SH, Taylor-MacAllister C, Freeman DW. Reproductive management of the mare. F-3974, Oklahoma Cooperative Extension Service. http://www.osuextra.com. 2001.
12. Hart PJ, Squires EL, Imel KJ, Nett TM. Seasonal variation in hypothalamic content of gonadotrophin-releasing hormone (GnRH), pituitary receptors for GnRH and pituitary content of luteinizing hormone in the mare. Biol Reprod. 1984;30:1055-1062.
13. Porter MB, Cleaver BD, Peltier M, Robinson G, Sharp DC. The effect of pulsatile gonadotropin-releasing hormone and estradiol dministration on luteinizlng hormone and follicle-stimulating hormone concentrations in pituitary stalk-sectioned ovariectomized pony mares. Domestic Anim Endocrinol. 1997;14:275-285.
14. YoungLai EV, Yie SM, Yeo J. Developmental patterns of bioactive and immunoreactive FSH in the female rabbit: effects of ovariectomy. Eur J Obstet Gynecol Reprod Biol. 1992;46:45-49.
15. Kesner JS, Padmanabhan V, Convey EM. Estradiol induces and progesterone inhibits the preovulatory surges of luteinizing hormone and follicle-stimulating hormone in heifers. Biol Reprod. 1982;26:571-578.