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PROLACTIN PROFILES DURING PREGNANCY AND SUCKLING IN RAHMANY, FINNISH EWES AND THEIR CROSSES

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SUMMARY

Twenty pregnant Rahmany (R), Finnish (F), 1/2 F× 1/2 R and 1/4 F× 3/4 R ewes were used to investigate, and compare the effects of breed, season and the time of blood sampling on the levels of prolactin (PRL) during pregnancy and suckling period. Blood samples were taken from the jugular vein and serum was separated and stored at -20°C until PRL was assayed using radioimmunoassay method. The samples were collected daily in the last week of every month of pregnancy and the first two months of suckling at 900, 1200 and 1400 hrs. in two mating seasons (Oct. and June). The results indicated that PRL levels were higher ($P<0.01$) throughout the pregnancy months than in the suckling months. Rahmany ewes had the highest PRL level, while the lowest PRL level was recorded with the Finninsh ewes. The PRL level gradually increased ($P<0.05$), with time of day.

Keywords: Sheep, prolactin, pregnancy, suckling period.

INTRODUCTION

The knowledge about hormones has vastly increased, but a complete satisfactory definition for these compounds is still lacking. Many hormones interact with each other in the overall coordination of reproductive processes.

Initiation and maintenance of lactation are complex phenomena involving many hormones including estrogen, progesterone, growth hormone, ACTH and prolactin. Prolactin is more vital for the initiation of lactation than for maintenance (Dukes, 1975). Prolactin cannot initiate milk secretion unless the gland has been brought to the proper stage of development by estrogens and progestines. In most species, LH provides the stimulus resulting in progesterone secretion from luteal tissue. However, Denamur *et al.* (1966), have accumulated evidence that prolactin is luteotropic in the ewe.

Prolactin concentration in farm animals is variable, such variability depends to large extent on age, sex, season, physiological state, breed, photoperiod, climatic conditions .... etc. (Von Brackel-Bodenhausen *et al.*, 1994). Several studies have

shown Finnish ewes to differ from other breeds in levels of hormones, such differences have ocurred in reproductive hormones (Maijala, 1996).

Therefore, the mian objectives of the present study were to investigate, and compare the effects of breed, seasons and time of blood sampling on the levels of prolactin during pregenancy and lactation of Rahmany, Finnish ewes and their crosses.

MATERIALS AND METHODS

Twenty pregenat Rahmany, Finn and their crosses ewes were used, five ewes of each (Rahmany (R), Finnish (F), 1/2 F× 1/2 R and 1/4 F× 3/4 R). They were randomly selected from the flock of Sakha Research Station belonging to the Institute of Animal Production Research where the study was conducted. The laboratory studies were carried out at the Animal Physiology Laboratory, Faculty of Agriculture, Mansoura University.

The animals were fed on diets to cover their nutrient requirements according to their live body weight during pregenancy as well as in the lactation period. Blood samples were taken from the jugular vein and serum was separated and stored at -20° C until prolactin was assayed. Starting from the second month of pregenancy the samples were collected daily at 900, 1200 and 1400 hr. during the last week of every month up to the second month after parturition. The sampling procedure was followed in two mating seasons (October and June with the exception of F ewes in June mating.

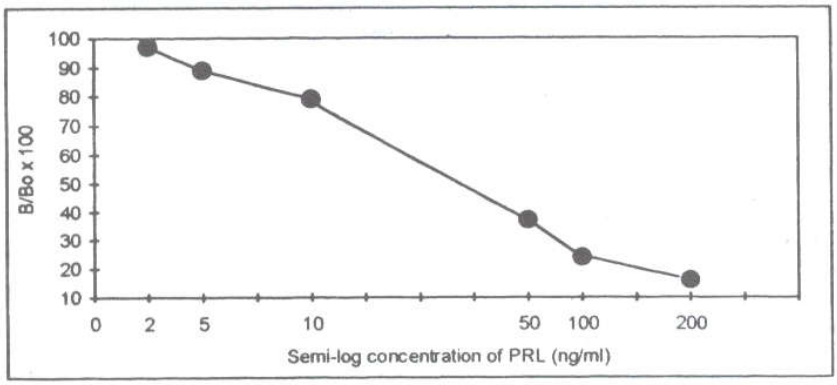

Figure 1. Standard curve used in RIA of prolactin hormone (composite of 9 standard curves).

Plasma levels of prolactin were measured using radioimmunoassay method (Radioassay Systems Laboratories, USA, 1980). The antiserum employed was Anti-Ovine prolactin at a dilution of 1 : 150.000. Only 50 µl of sample was processed and the standard tubes contained 0, 2, 5, 10, 50, 100 and 200 ng/ml of prolactin (Fig. 1). Data were statistically analysed by Harvey's (1990) mixed model computer program.

RESULTS AND DISCUSSION

Effect of season

The results in Table (1) and graphically shown in Figures 1 and 2 indicate clearly that, the PRL concentrations were slightly but insignificantly higher in October mating ewes (OM) than in June mating ewes (JM), (4.88 vs 4.81 ng/ml). However, Mori *et al.* (1985) found high values of PRL in summer non-breeding seasons and low values in winter (breeding seasons). Also, Von Brackel-Bodenhausen *et al.* (1994) reported that high ambient temeperature resulted in increased PRL concentrations in goats.

Table 1. Least squares means and standard errors (S.E) of different factors affecting plasma prolactin in ewes.

Classification	Mean ± S.E (ng/ml)
Overall mean	5.03 ± 0.04
Mating season :	
June	4.81 ± 0.05^{d}
October	4.88 ± 0.05^{d}
.Breed :	
R	5.25 ± 0.06^{c}
F	4.47 ± 0.11^{d}
1/2 F × 1/2 R	4.69 ± 0.06^{b}
1/4 F × 3/4 R	4.61 ± 0.06^{a}
Months :	
Pregnancy 2	4.85 ± 0.09^{j}
3	4.65 ± 0.09^{k}
4	6.29 ± 0.09^{l}
5	6.64 ± 0. 09^{m}
Suckling 1	3.92 ± 0.09^{n}
2	3.79 ± 0.09^{o}
Time (hr.)	
900	4.67 ± 0.06^{r}
1200	4.92 ± 0.06^{s}
1400	4.97 ± 0.06^{t}

Within each classification, means denoted with same superscripts do not differ significantly ($P<0.05$).

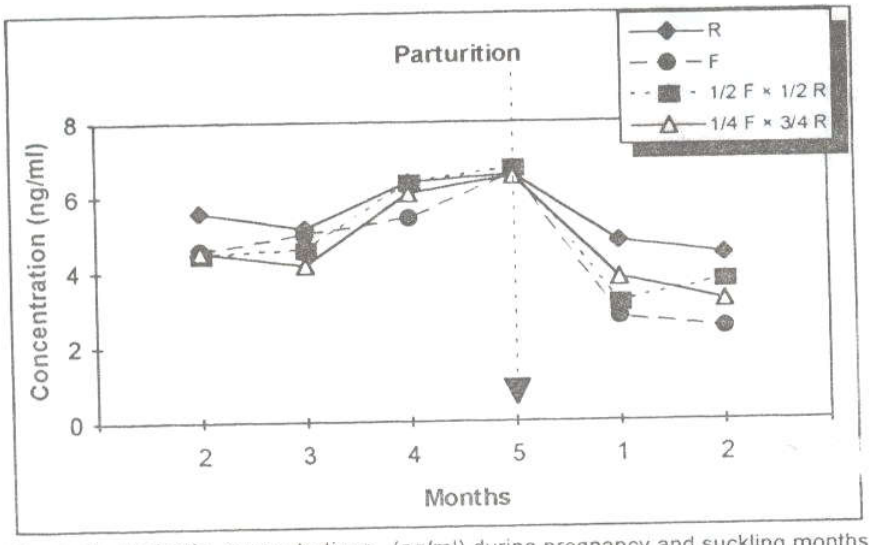

Figure 2. Prolactin concentrations (ng/ml) during pregnancy and suckling months following October mating for Rahmany (R), Finn (F), 1/2 F × 1/2 R and 1/4 F× 3/4 R ewes.

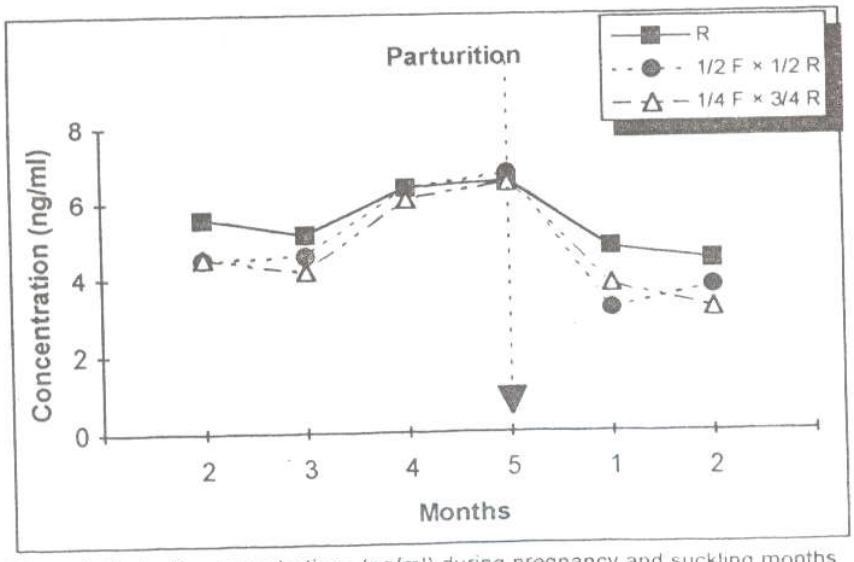

Figure 3. Prolactin concentrations (ng/ml) during pregnancy and suckling months following June mating for Rahmany (R), 1/2 F × 1/2 R and 1/4 F × 3/4 R ewes.

Table 2. Interactions of season, breed and time of sampling.

Classification	Mean ± S.E (ng/ml) Prolactin
Season × Breed :	
October :	
R	5.39 ± 0.09
F	4.47 ± 0.11
1/2 F × 1/2 R	4.65 ± 0.09
1/4 F × 3/4 R	4.61 ± 0.09
June :	
R	5.09 ± 0.09
1/2 F × 1/2 R	4.74 ± 0.09
1/4 F × 3/4 R	4.60 ± 0.09
Breed × Time :	
R :	
900	5.21 ± 0.11
1200	5.41 ± 0.11
1400	5.12 ± 0.11
F :	
900	4.36 ± 0.18
1200	4.41 ± 0.18
1400	4.64 ± 0.18
1/2F × 1/2 R	
900	4.47 ± 0.11
1200	4.71 ± 0.11
1400	4.90 ± 0.11
1/4 F × 3/4 R :	
900	4.32± 0.11
1200	4.62 ± 0.11
1400	4.88 ± 0.11

Effect of the month of pregenancy and suckling

Generally, PRL levels were higher throughout the pregenancy than during suckling. The PRL concentration reached the highest level in the fifth month of gestation period. The PRL level decreased sharply in the first month of suckling and remained low in the second month. Such differences were highly significant ($P<0.01$). This trend of higher PRL level with advance of pregenancy was observed in all breed groups in both mating season (Figs. 1 and 2), indicating the obvious effect of pregenancy on PRL regardless of season or breed. The interaction between breed and season of mating was not statistically significant (Table 2). Hart (1975) found high levels of PRL which were not only associated with the long day length periods but also, with milking stimulus. Dlamini *et al.* (1995) reported an increase in the PRL and estradiol-17β levels that coincided with parturition in pigs.

in the PRL and estradiol-17β levels that coincided with parturition in pigs. Advancing of gestational period was correlated with the high level of PRL and these supported the luteotropic function of PRL (Bramly and Menzies, 1987). The PRL level in hysterectomized gilts remained low, whereas, in pregenant gilts PRL increased steadily at parturition and remained high during lactation (Dlamini *et al.*, 1995).

Effect of breed

Highly significant breed differences ($P<0.01$) were recorded for the PRL levels (Table 3). Rahmany had the highest PRL level in both OM and JM. On the other hand, F had the lowest values in OM (Table 1). It is of intrest to note that the crosses had intermediate values between the two parents, indicating possible genetic effect on PRL concentration, but this deserves more attention in future trials.

Table 3. F-ratios of least squares analysis of variance for factors affecting plasma prolactin concentrations in ewes.

Source of Variance	d.f	F-ratio
Mating season	1	0.984 NS
Breed	3	29.274**
Month	5	146.041**
Time	2	6.300**
Season × Breed	2	2.586 NS
Breed × Month	10	5.303**
Breed × Time	4	2.779*
Remainder, Remainder M.S	600	0.860635

Diurnal changes of PRL levels

Levels of PRL measured at different times, 900, 1200 and 1400 hr. were significantly different ($P<0.05$). In general, levels of PRL gradually increased from 4.67 ± 0.06 ng/ml at 900 hr. to 4.97 ± 0.06 ng/ml at 1400 hr. (Tables 1&3) and this may be attributed to the associated increase in ambient temperature. The effect of photoperiod on PRL secretion was overriden by heat stress in goats (Von Brackel-Bodenhausen, 1994). High ambient temperature resulted in increasing PRL concentrations in goats (Von Brackel-Bodenhausen, 1994).

The magnitude of increase in PRL concentration with time of day, differed however from one breed group to another (Table 2), and this was further indicated by significant ($P<0.05$) interaction between breed and time of day (Table 3).

REFERENCES

Bramly, T. A. and G. S. Menzies, 1987. Receptors for lactogenic hormones in the porcine corpus luteum: properties and luteal phase concentrations. J. Endocrinology, 113 : 355.

Denamur, R.; J. Martinet and R.V. Short, 1966. Secretion de la progestérone par les corpes jaunes de la brebis aprés hypophysectomie, section de la tige pituitaire et hystérectomie. Acta endocrinol., 52 : 72 - 90.

Dlamini, B.; L. Yangfam; J. Klindt and L. Andreson, 1995. Acute shifts in Relaxin, Progestone, Prolactin and Growth hormone secretin in Chinese Meishau gilts during late pregenancy and after hysterectomy. J. Anim. Sc., 73 : 3732 - 3742.

Dukes, H.H., 1975. Dukes Physiology of Domestic Animals. 8 th ed., Cornell Univ. Press, Etthaca and London, PP. 1239 - 1241.

Hart, J.C., 1975. Sseasonal factors affecting the release of prolactin in goats in response to milking. J. Endocr., 64 : 313 - 322.

Harvey, W.R., 1990. User's Guide for LSMLWM. Mixed model least-squares and maximum likelihood computer program. PC-Version 2. Ohio State University.

Maijala, K., 1996. Performance of pure Finnsheep in research trails in different countries. Symposium on : Use of exotic breeds in improving sheep production, Finnsheep as a case study. Egypt, Cairo, April 22 - 23.

Mori, Y.; K.I. Macda; T. Sawasaki and Y. Kano, 1985. Photoperiodic control of prolactin secretion in the goat. J. Anim. Reprod., 31 : 9.

Radioassay Systems Laboratories, USA, 1980. Inc., California, USA.

Von Brackel-Bodenhausen, A.; W. Wuttke and W. Holtz, 1994. Effects of photoperiod and slow-release, preparation of Bromocryptine and Melatonin on reproductive activity and prolactin secretin in female goats. J. Anim. Sci., 72 : 955 - 962.

مستويات هرمون البرولاكتين أثناء الحمل وفترة الرضاعة فى أغنام الرحمانى والفنلندى وخلطانهما.

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تهدف الدراسة إلى معرفة مستويات هرمون البرولاكتين فى أثناء فترتى الحمل والرضاعة فى أغنام الرحمانى والفنلندى وخلطانهما فى موسمين للتلقيح (يونيو وأكتوبر). إستخدمت خمس نعاج من كل نوع وأخذت عينات الدم إبتداء من الشهر الثانى للحمل وحتى الولادة ، ثم أثناء شهرين بعد الولادة (الرضاعة). وتم قياس مستوى الهرمون فى البلازما بطريقة المناعة الإشعاعية.

وأظهرت النتائج أن مستوى البرولاكتين كان عالياً بعد موسم تلقيح أكتوبر عن موسم يونيو وفى أثناء فترتى الحمل والرضاعة ، و كان أعلى تركيز لهرمون البرولاكتين فى أثناء الشهر الرابع والخامس من الحمل ثم إنخفض بشدة فى الشهر الأول للرضاعة وظل منخفضاً كذلك فى الشهر الثانى من الرضاعة.

كانت نعاج الرحمانى عالية فى مستوى البرولاكتين ، بينما كانت نعاج الفنلندى أقل ، وجاء تركيز البرولاكتين فى النعاج الخليط بينهما.

إرتفع تركيز هرمون البرولاكتين تدريجيا من الساعة التاسعة صباحاً إلى الساعة الثانية بعد الظهر.

من النتائج السابقة يتضح أن لكل من النوع وفصل السنة وفترات النهار تأثير على مستوى هرمون البرولاكتين فى دم النعاج تحت الدراسة وذلك فى أثناء شهور الحمل والرضاعة.