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MONITORING THE POSTPARTUM OVARIAN ACTIVITY AND PREGNANCY IN SHE GOATS WITH NORMAL AND ABNORMAL PARTURITION BY MEASURING MILK AND FECAL PROGESTERONE

(With 3 Tables and 4 Figures)

By

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مراقبة نشاط المبيض بعد الولادة والحمل في إناث الماعز ذات الولادات الطبيعية والغير طبيعية بقياس البروجيستيرون في اللبن والبراز

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تهدف هذه الدراسة إلى تقدير هرمون البروجيستيرون في اللبن والبراز لتقييم نشاط المبيض بعد الولادة وكذلك تقييم الحمل في إناث الماعز . استخدمت لهذه الدراسة ١٧ من إناث الماعز تتراوح أعمارها من ٣-٤ سنوات ذات ولادات طبيعية وغير طبيعية. أظهرت الدراسة زيادة معنوية في هرمون البروجيستيرون عند يوم الولادة وفترة النفاس في كل من اللبن والبراز في الماعز ذات احتباس المشيمة بالمقارنة بالماعز التي تعاني من انقلاب المهبل وذات الولادة الطبيعية . خلال اليوم السابع بعد الولادة كان هناك نقص حاد في معدل هرمون البروجيستيرون في كل من اللبن والبراز في الماعز ذات احتباس المشيمة ولم يكن هناك اختلافات بين الماعز ذات انقلاب المهبل وذات الولادة الطبيعية . في كل الماعز كان هناك زيادة معنوية في معدل البروجيستيرون في اليوم الرابع عشر والواحد والعشرين بعد الولادة . وكان أقل معدل لهرمون البروجيستيرون في كل من اللبن والبراز خلال حدوث أول شبق بعد الولادة . في الماعز العشار كان هناك زيادة ملحوظة في هرمون البروجيستيرون في اليوم الواحد والعشرون والثامن والعشرون بعد التلقيح في كل من اللبن والبراز. وكان أعلى معدل لهرمون البروجيستيرون في البراز مع تقدم الحمل في اليوم المائة والعشرون من الحمل وبعد ذلك قلت نسبته في يوم ما قبل الولادة . وكان أقل معدل للبروجيستيرون في البراز بعد الولادة بيومين . كذلك لو حظ أن هناك زيادة معنوية في البروجيستيرون في اللبن والبراز للماعز التى ولدت توأم والتي ولدت ثلاث عنها في الماعز ذات المولود الواحد. وقد أظهرت الدراسة أن نسبة البروجيستيرون في اللبن والبراز في الماعز يمكن استخدامها كوسيلة جيدة لتقييم نشاط المبيض بعد الولادة في كل من الماعز ذات الولادات الطبيعية والغير طبيعية وكذلك لتشخيص الحمل المبكر وتقييم الحمل طوال فترة الحمل .

SUMMARY

The present investigation aimed at studying the use of milk and fecal progesterone contents for assessing the postpartum ovarian activity and pregnancy in she goats. Seventeen normal and abnormal parturient goats (aged 3-4 years) were used for this work. There was a marked significant elevation in the concentration of milk and fecal progesterone during O. day of parturition and early postpartum period in she goats with retained placenta, than those with vaginal prolapse and normal parturient ones. During the 7th day postpartum, the level of this hormone in milk and feces were sharply decreased in she goats with retained placenta and not varied in females with vaginal prolapse and normal parturient ones. In all she goats, the milk and fecal progesterone levels were some what increased during the 14th and 21th days postpartum. The lowest values of this hormone in milk and feces were observed during the 1 st postpartum heat. In pregnant she goats, the milk and fecal progesterone contents showed prominent significant elevation particularly during the 21th and 28th days postservice. With advancement of pregnancy, the fecal progesterone level increased significantly, reaching its maximum value at 120th day of gestation, followed by a significant reduction in its concentration one-day before birth. The minimum fecal progesterone content was detected 2- days postpartum. In aborted she goat; the level of this hormone in feces sharply dropped at the O- day of abortion and 2-days later. There was a significant elevation in milk and fecal progesterone profiles in she goats having triple feti than in those carrying twins. The lowest concentrations of this hormone in milk and feces were observed in does with single fetuses.

Key words: *Postpartum Ovarian Activity*

INTRODUCTION

Although rectal palpation are currently available for examination of the reproductive organs and pregnancy diagnosis in large animals, their application is not recommended as a suitable method of diagnosing pregnancy in small ruminants, especially in she goats, since it is more hazardous with respect to rectal injury and abortion (Ishwar, 1995).Non return to estrus due to pregnancy cannot be differentiated from seasonal anestrus at the end of breeding season, in addition to it is unsuitable method when does are synchronized and bred during the seasonal

anestrous period (Memon and Ott 1980) Several studies had been made in goats for assessing their reproductive status by measuring the progesterone in the peripheral blood (Thibier et al. 1982; Ozsar et al. 1984; Murray and Newstead., 1988; Bretzlaff et al. 1989; Abou-EL-Roos, 1996 and Hussain et al., 1996). Other reports had been made for estimation of progesterone in urine (Kripatrick et al., 1990 and Schwarzenberger et al., 1996) and saliva (Cao et al., 1988; Kanchev et al., 1988; Abdel-Fattah et al., 1995 and Moriyoshi et al. 1996).Milk and feces seem most suitable to obtain than other samples (Hirata and Mori,1995 and Schwarzenberger et al., 1996) .Accordingly, milk progesterone had been used in goats as an aid for pregnancy diagnosis (Jain et al., 1980; Pennington et al., 1982; Thibier et al., 1982; Ozsar et al., 1984; Murray and Newstead et al., 1988 and Engeland et al., 1997) . Fecal progesterone is used for confirmation of reproductive status in farm animals including sheep and goats (Palme et al., 1989; Schwarzenberger et al., 1992; Brown et al., 1994; Sanders et al., 1994; Hirata and Mori, 1995; Palme. et al., 1996; Schwarzenberger et al., 1996 and Abdel- Ghaffar., 1996). The present work aimed at studying the use of milk and fecal progesterone as an indicator for postpartum ovarian activity and pregnancy diagnosis in she goats living under field Egyptian condition.

MATERIAL and METHODS

Animals:

A total number of 17 parturient she goats aged 3-4 years selected from 22 she goats with normal and abnormal parturition, living at Meniet El- kamh, Sharkia Governorate and Birket El- Saba, Menoufia Governorate were used in the present work. Feeding of animals on grassing a long day light and at night receive a concentrate. She goats were classified according to the nature of parturition into two main groups; the 1st one is normal parturient females (n=8). The 2nd group is the abnormal parturient goats, including those with retained placenta (n=4) and vaginal prolapse (n=5). All abnormal parturient does were treated. Heat detection was done using an aproned buck in order to determine the 1st postpartum heat and to detect the returned she goats following their mounting with good fertile bucks by the aid of sheep and goat herder.

Pregnancy was confirmed at the 3rd month of gestation by abdominal palpation. All pregnant she goats were observed until the next

kidding. Time elapsed till the 1 st postpartum heat in both groups and gestation period in pregnant goats are presented in table 1.

Sampling:

Milk and fecal samples were collected from both normal and abnormal parturient she goats at 0-day of parturition, 1 st day, 7 th, 14 th and 21 th days after birth, as well as during the 1st post partum heat, at day of mounting, 7 th, 14 th, 21 th, 28 th and45 th days after mounting. Fecal samples were also obtained during 60 th, 90 th, 120 th and 145 th days of gestation as well as during 0-day of parturition from all parturient she goats. In aborted goat, the fecal samples were collected during 0-day of abortion and 3rd day later.

Extraction and radioimmuno assay of milk and fecal samples:

Following collection of milk samples, the progesterone hormone was extracted from the whole milk by diethyl-ether (Lamming and Bullman. 1976 and Shawki. 1989). The extracted samples were stored at- 20C until progesterone was radio-immuno- assayed using I^{125} (Lamming and Bullman. 1976; Hoffman et al.; 1979; Laitinen et al., 1985 and Chandra et al., 1993).

After collection of fecal samples, the extraction procedure and assaying of progesterone concentration were determined according to Hirata and Mori (1995).

Statistical analysis:

Data obtained statistically analyzed using statistical analysis system (SAS) (1987).

RESULTS

Results are obtained at Tables 1, 2 & 3 and Figures 1,2,3 & 4.

DISCUSSION

The milk and fecal progesterone concentration in she goats reflects the level of this hormone in blood plasma, however, the progesterone content is much higher in milk (Holdsworth and Davies. 1979; Thibier et al., 1982; Ozsar et al., 1984 and Murray and Newstead. 1988) and feces (Hirata and Mori. 1995). As presented in Table 2 and Fig. 1 and 2, there was a sharp significant increase in the levels of milk and fecal progesterone during O- day of parturition in abnormal parturient she goats with retained placenta (48.4 ng/ml and

248.9 ng/gm, respectively) than those with vaginal prolapse (4.1 ng /ml and 76.7 ng/gm, respectively) and normal parturient ones (3.2 ng/ ml and 61.8 ng/ gm, respectively). A nearly similar trend was found during the 1st day after birth. However, Choe et al. (1986) and Abou-El-Roos (1996) reported a nearly similar pattern for blood progesterone level in normal parturient Korean and Balady goats, respectively. Moreover, the pronounced reduction in both milk and fecal progesterone at O-day of parturition especially those with vaginal prolapse may be due to the increase estrogen secretion (hyperestrogenism) that causes a more relaxation of the pelvic ligament and adjacent structures resulting in vaginal prolapse (Roberts, 1971). By the 7th day postpartum, the concentration of this hormone in milk and feces sharply dropping in abnormal parturient she goats with retained placenta (7. 8 ng/ ml and 86.9 ng/ gm, respectively) and gradually elevated in females with vaginal prolapse (4.6 ng / ml and 68.7 ng/gm, respectively) and normal parturient ones (6.9 ng / ml and 79.2 ng/ gm, respectively), followed by a gradual continuous increase in all normal and abnormal parturient she goats during 14th and 21th days after birth in both milk (6.7-11.2 ng/ml) and feces (6.8 – 98.9 ng/ gm) . A nearly similar results were recorded for plasma progesterone level during postpartum period in normal kidding Balady goats (Abou- El-Roos., 1996) and indigenous goats in Zimbabwe (Kadzere et al. 1996). Another reduction in the level of progesterone hormone in milk (5.6- 7.9 ng /ml) and feces (48.8- 65.9 ng/gm) were recorded during the 1st postpartum heat in all she goats showing estrus. This may be returned to the sharp drop in plasma progesterone profile during heat as reported by Abou –El –Roos (1996) in Balady goats.

The inability to detect early pregnancy can result in economic losses due to longer kidding intervals (Ishwar,1995). He reported that visual observation, abdominal palpation, services records and non return to estrus are not reliable methods for diagnosing early pregnancy. In the present work, Table 3 and Fig 3, showed that the milk progesterone concentration sharply elevating at the 7th day after mounting (44.4 ng/ml), followed by a continuous significant increase in the level of this hormone with advancement of gestation in pregnant she goats during 21th and 28 th days post mounting (76.7 and 90.7 ng/ ml, respectively). In this respect, Liewelyn et al (1996) reported that the progesterone prepares the uterus for implantation and maintains pregnancy. Moreover, Holdsworth and Davies (1979) classified she goats as positive pregnant when the milk progesterone content above 10ng / ml between 22 and 26

days post breeding with an accuracy 85.9% for detecting pregnancy and 100% for determined a level of 7.25 ng/ ml or above as an indication of pregnancy between days 19 and 27 post breeding. However, in goats, during pregnancy , the progesterone is secreted mainly from the corpus luteum (Liewelyn and Kadzere, 1992). In addition, the progesterone test in doe and ewe is a good test for non pregnancy but only a fair test for pregnancy, because of elevating progesterone levels only indicate the presence of a functional corpus luteum, several conditions like hydrometra, pyometra, early embryonic death may extend the luteal life span and give false positive results (Ishwar, 1995).

The fecal progesterone metabolite analysis appear more practical for monitoring corpus luteum function, pregnancy and abortion in sheep and goats (Hirata and Mori,1995 and Abdel-Ghaffar. 1996). Consequently, Table.3 revealed a continuous significant increase in fecal progesterone during the 7 th and 14 th days post service (173.1 and 267.5ng/ gm, respectively), than that detected during the day of mating (43.4 ng/gm), followed by a sharp continuous elevation in pregnant does during 21th and 28th days post service (267.5 and 350.4 ng/gm, respectively). This may be due to their secretion from large and small cells of corpus luteum gravidities (Cupps, 1991) Moreover, an elevating progesterone level only indicated the presence of a functional corpus luteum (Ishwar. 1995). In addition, the corpus luteum is essential for maintenance of pregnancy in goats, as it is the main source of progesterone (Hussain et al., 1996). Also, the existence of corpora lutea and placenta during pregnancy dramatically increased serum progesterone concentration (Manalu et al., 1996). However, the ovaries and pituitaries in she goats are necessary during the whole gestation period and a doe will abort promptly following the removal of either ovaries or pituitaries (Heap and Flint. 1984).

With advancement of gestation, the concentration of fecal progesterone (Table.3) showed a more continuous increase at 45th day (513.5 ng/gm), 60th day (580.1 ng/ gm), 90th day (618.5ng/gm) and 120th day (613.9 ng/gm). This may be returned to the sharp elevation in plasma progesterone level that was significantly higher between day 91 and day 120 of pregnancy, than during the 1st 90 days (Irving et al. 1972; Thorburn and Schneider, 1972; Kaushik et al. 1992 and Hussain et al. 1996). However, the fecal progesterone content sharply decreased one day before parturition (294.8 ng/gm), reaching its minimum value 2 days after birth (45.3 ng/gm). This may be attributed to the rapid decline in

the concentration of this hormone in plasma to nearly zero at the time of fetus expulsion (Hussain et al. 1996).

The sharp drop in fecal progesterone concentration in aborted she goat at O.day of abortion (41.4ng/ gm) and 3 day later (10.1 ng /gm) as recorded in our investigation may be due to impaired luteal function that results in lower ($P<0.01$) plasma progesterone level in aborting compared to normal goats, irrespective to the stage of gestation (Hussain et al., 1996). Moreover, the maternal serum progesterone content could be used as an indicator of the possibility of abortion of does at least 7 weeks prior to the abortion date (Manalu et al., 1996).

Table 3 and Fig 3 and 4 emphasized that the maximum level of milk and fecal progesterone along the whole gestation period were detected in she goats having triple feti, followed by that observed in females carrying twins. The lowest value of this hormone in both milk and feces were obtained in she goats with single feti. This may be refered to the placental mass or the number of corpora lutea formed during the preceding estrous cycle or combination of both (Manalu et al., 1996). They reported that the progesterone content could be used as a strong parameter to predict whether the does are carrying single or twin fetuses. The increase progesterone level between day 60 and day 70 of gestation was greater in twin bearing goats than in those with a single fetus (Thorburn and Schneider, 1972). Goats with multiple corpora lutea and fetuses had a higher progesterone level than those having one corpus luteum or single fetus (Jarrell and Dzuik. 1991). There was a linear relationship between number of corpora lutea and serum progesterone level in goats (Appavand Holtz.1992). The plasma progesterone level in goats carrying multiple fetuses was found to be significantly higher than in those bearing single kids (Hussain et al., 1996. And Abou El – Roos, 1996).

In conclusion, the milk and fecal progesterone contents in she goats could be used as a good tool for assessing the postpartum ovarian activity accompanied with normal and abnormal parturition and for early detection of pregnancy and number of feti. In addition to the use of fecal progesterone for confirmation of pregnancy along the whole gestation period.

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Table 1. The main reproductive characteristics of she goats under investigation

Item \ Condition of Parturition	Normal parturient she goats		Abnormal parturient she goats			
			With vaginal prolapse		With retained placenta	
	n	%	n	%	n	%
- Incidence of she goats showing postpartum heat	8/9	88.89%	5/7	71.43%	4/6	66.67%
- Time elapsed till the 1st postpartum heat (days)	8	29.55 ± 1.84[b]	5	60.51 ± 3.54[a]	4	70.36 ± 4.60[a]
- Gestation period						
- Goat with single feti	4	150.86 ± 0.86a				
- Goat with double feti	4	146.25 ± 1.49b				
- Goat with triple feti	3	145.40 ± 1.16b				

Means with different alphabetical superscripts are significantly different from each other at level ($P<0.05$).

Table (2) : Milk and fecal progesterone for parturient (normal and abnormal) she goats during the post postpartum period (M ± SE).

	n	Milk progesterone (ng/ml)						Fecal progesterone (ng/gm)					
		0-day of birth	1st day after birth	7th day after birth	14th day after birth	21st day after birth	1st post partum heat	0- day of birth	1st day after birth	7th day after birth	14th day after birth	21st day after birth	1st post partum heat
Normal parturient goats	8	3.2±0.8^{E}	4.8 ± 0.9^{DE}	6.9 ± 1.8^{CDE}	8.8± 1.6^{C}	11.2 ± 2.6^{C}	5.6 ± 1.4^{CDE}	61.8± 11.7^{EF}	54.7 ±12.6^{DEF}	79.18±14.6^{CDE}	98.96±18.6^{BCDE}	86.98±12.9^{CD}	48.8 ± 7.6^{F}
Abnormal parturient goats													
- With retained placenta	4	48.4±9.9^{A}	26.5± 6.9^{B}	7.8 ±2.6^{CD}	10.5±2.^{CD}	10.6±3.4^{CDE}	7.9±2.0^{CDE}	248.9±19.8^{A}	138.7±15.9^{B}	86.95±13.7^{CD}	98.19±15.8^{BCDE}	76.82±11.6^{DEF}	65.9±9.8^{CDEF}
- With vaginal prolapse	5	4.1 ± 0.7^{DEF}	2.8± 0.6^{E}	4.6±1.3^{D}	6.7±1.8^{CD}	8.2±2.4^{CDE}	6.8±1.8^{CDE}	76.7±8.8^{C}	32.18±6.8^{G}	68.74±9.6^{EF}	89.95±10.6^{CDE}	96.72 ±9.9^{CDE}	56.7±6.7^{F}

Means with different alphabetical superscripts in each category are significantly different from each other at level (P<o.05).

Table 3. Milk and Fecal progesterone profile in pregnant she goats (M ± SE).

	n	0-day of mounting	7th day post-mounting	14th day post-mounting	21th day post-mounting	28th day post-mounting	45th day post-mounting	60th day post-mounting	90th day of pregnancy	n	120th day of pregnancy	1-day before birth	0-day after birth
Milk progesterone (ng/ml)													
- With single feti	5	4.8 ±0.8 ^{D}	36.6 ±4.6 ^{F}	48.9 ±5.6 ^{E}									
- With double feti	4	5.6 ±0.7 ^{C}	43.7 ±5.8 ^{EF}	56.8 ±6.3 ^{DE}	68.6±9.2 ^{BCDE}	79.9±8.4 ^{ABCD}	103.7±12.6 ^{AB}						
- With triple feti	3	3.8 ±0.6 ^{G}	52.9 ±4.4 ^{F}	65.6 ±5.6 ^{CDE}	76.8 ±8.9 ^{ABCD}	92.6 ^{ABC}±11.4	115.8±11.9 ^{A}						
Over all mean	12	4.5 ±0.7	44.4±4.9	57.1±5.9	84.6±11.6 ^{ABCD}	99.5 ^{ABC}±13.7	129.4±11.4 ^{A}						
Fecal progesterone (ng/gm)					76.7±9.9	90.7 ±11.1	116.3±11.8						
- With single feti	5	48.9 ±6.8 ^{B}	156.9 ±13.8 ^{C}	249.8±19.6 ^{EF}	312.8±29.8 ^{CDEF}	392.9 ±34.8 ^{CDE}	481.8±39.8 ^{BCD}	548.4 ±41.9 ^{ABCD}	586.9 ±46.8 ^{ABCD}	4	562.9±52.2 ^{ABCD}	268.9 ±21.8 ^{EF}	49.8 ±5.3 ^{D}
- With double feti	4	38.4 ±5.4 ^{H}	178.6 ±16.9 ^{G}	268.7±22.9 ^{EF}	349.6±32.9 ^{CDE}	418.8 ±29.6 ^{BCDE}	518.9±36.9 ^{ABCD}	579.8±46.8 ^{ABCD}	618.8 ±51.6 ^{AB}	4	626.8 ±46.9 ^{AB}	296.8 ±19.6 ^{EF}	67.9 ±6.7 ^{D}
- With triple feti	3	42.8 ±4.9 ^{H}	183.7±14.6 ^{G}	283.9±21.8 ^{F}	388.9 ±26.9 ^{BCDE}	436.9±31.9 ^{BCDE}	539.7±32.6 ^{ABCD}	611.9±49.9 ^{AB}	649.8 ±49.4 ^{AB}	3	652.2 ±58.2 ^{AB}	318.6 ±24.9 ^{CDEF}	80.3 ±9.4 ^{B}
over all mean	12	43.4±5.7	173.1±15.1	267.5±21.4	350.4±29.7	416.2±32.1	513.5±36.4	580.1±46.2	618.5±49.2		613.9±52.4	294.8±22.1	66±7.1

Means with different alphabetical supersercripts in each category are significantly different from each other at level (P<o.o 5)

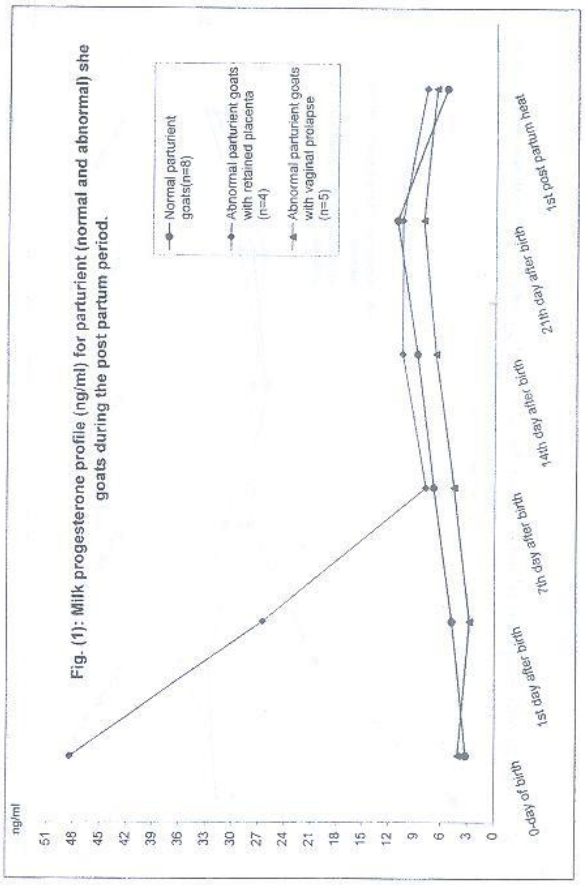
Fig. (1): Milk progesterone profile (ng/ml) for parturient (normal and abnormal) she goats during the post partum period.
Normal parturient goats(n=8)
Abnormal parturient goats with retained placenta (n=4)
Abnormal parturient goats with vaginal prolapse (n=5)
ng/ml
51
48
45
42
39
36
33
30
27
24
21
18
15
12
9
6
3
0
0-day of birth
1st day after birth
7th day after birth
14th day after birth
21th day after birth
1st post partum heat

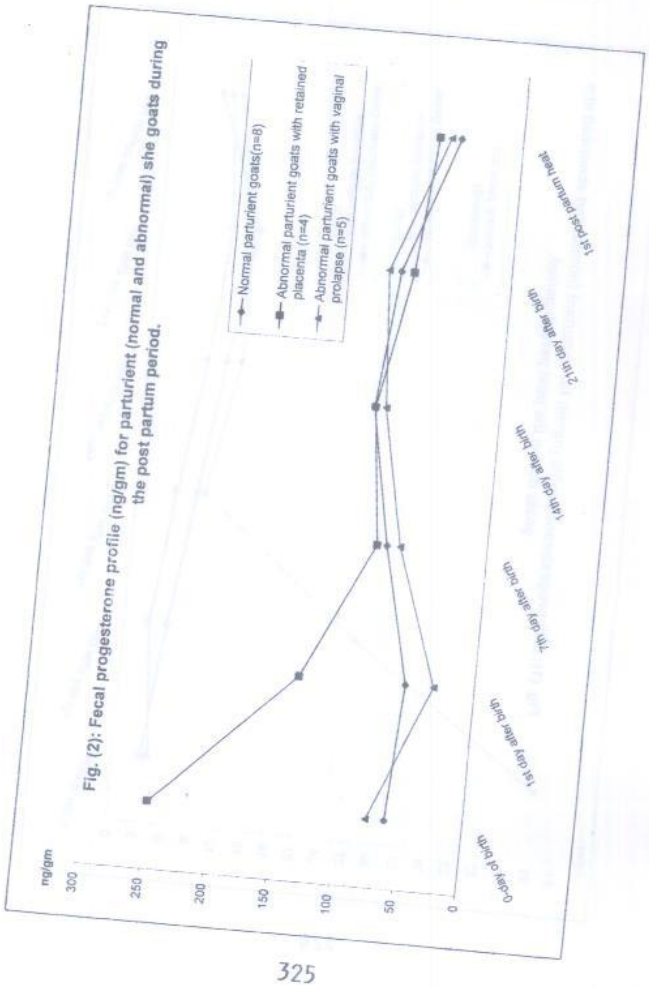

Fig. (2): Fecal progesterone profile (ng/gm) for parturient (normal and abnormal) she goats during the post partum period.

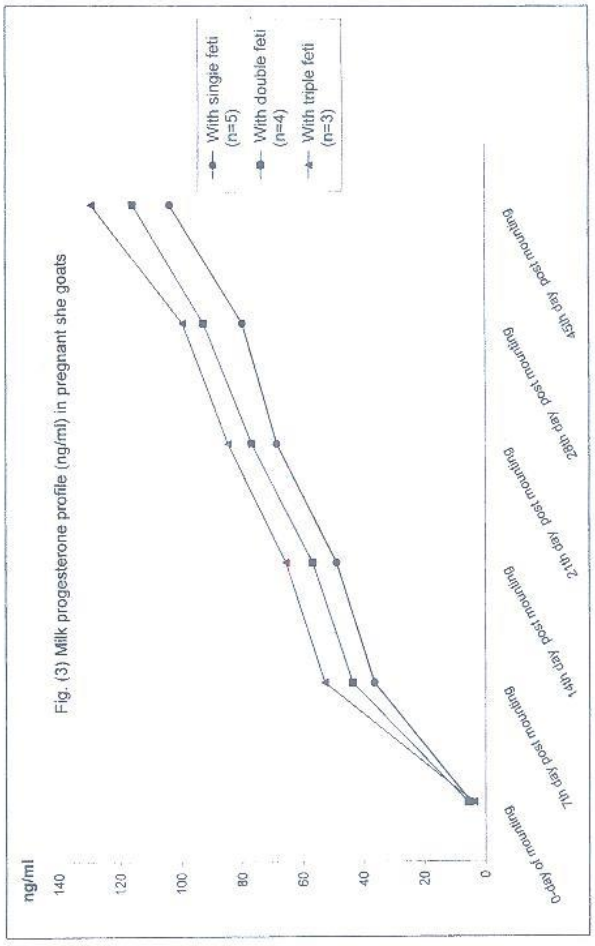

Fig. (3) Milk progesterone profile (ng/ml) in pregnant she goats

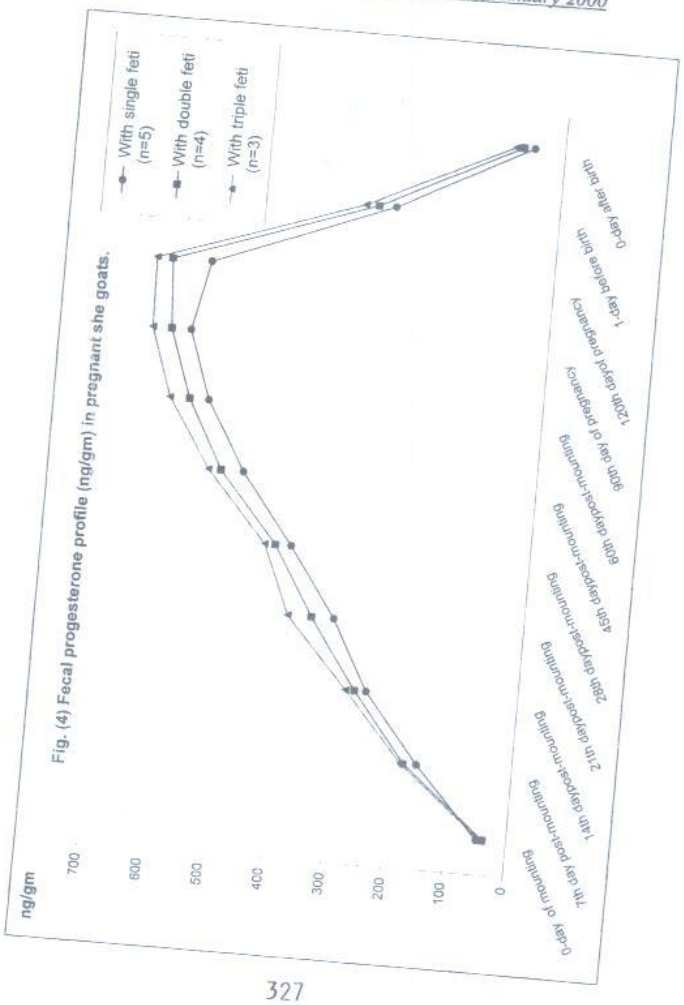

Fig. (4) Fecal progesterone profile (ng/gm) in pregnant she goats.