4:Results and Discussions

4.1: Gestation length (days):

Data listed in Tables (4 and 6) show the effect of various factors studied on the gestation length.

4.1.1: Effect of breed:

It could be seen from the Tables that, Ossimi ewes had higher pregnancy duration (150.94 days) than Rahmani ewes (149.49 days). Analysis of variance showed highly significant variations ($P < 0.001$) for pregnancy duration due to the effect of breed.

These results come in complete agreement with those obtained by **EL- Sayed and Abdel-Ghaffar (1998)** who reported that Ossimi ewe had significantly ($P < 0.05$) higher gestation period than Rahmani ones (149.98 vs 149.54 days, respectively). However, the length of gestation was determined to be 157.2 ± 0.1 and 151.68 ± 0.50 days in Ossimi ewes **(Mabrouk *et al.*, 1976 and El-Sayed, 1988,** respectively) and 151.89 ± 0.39 days in Rahmani ewes **(El- Fouly *et al.*, 1984).**

4.1.2: Effect of parity number of ewes:

Inspecting data of gestation length in ewes of different parities, it was found that the shorter length was observed in ewes of the first parity (149.76 ± 0.28 days) while the higher of gestation length was found in ewes of the second parity (150.89 ± 0.18 days). These results are similar to that obtained by **El- Sayed (1988)** with Ossimi and Rahmani ewes. Analysis of variance showed highly significant effect ($P < 0.001$) on pregnancy duration due to the effect of parity number (Table 6). These results are in agreement with those obtained by **El-Sayed and Abdel Ghaffar (1998)** with Ossimi and Rahmani ewes. However, El-

Sayed (1988) with Ossimi ewes showed no significant effect due to parity number on the gestation period.

4.1.3: Effect of sex of feti:

Ewes having female feti had a longest gestation length (151.04 ± 0.17 days) while the shortest gestation length was found in ewes having both male and female twins (149.05 ± 0.25 days). However, the corresponding value in ewes having male feti was 150.55 ± 0.20 days. These results come in complete agreement with those found by **El- Sayed and Abdel – Ghaffar (1998)** with Ossimi and Rahmani ewes, who showed the same trend with highly significant varations ($P < 0.001$) on gestation length due to the effect of sex of feti. Also, the same trend obtained by **Suliman *et al.*, (1978) and El- Sayed (1988)** but with non significant effect of sex of feti on gestation length.

4.1.4: Effect of type of feti:

It was found that the pregnancy duration decreased in twins (150.01 ± 0.21 days) compared with single feti (150.41 ± 0.15 days). Analysis of variance showed nonsignificant effect of type of feti (single or twins) on pregnancy duration period. Results obtained disagreed with those obtained by **Badawy *et al.*, (1973), Suliman *et al.*, (1980), Ayhan Ozturk (1995) and El-Sayed and Abdel Ghaffar (1998)** indicated that the length of the gestation period was significantly ($P < 0.05$ or $P < 0.001$) affected by the number of lamb born , the single bearing ewes deliverd later than the twin – bearing ewes .

Table: (4) Least squar means ± standard error (L.S.M. ± S.E.) of factors affecting gestation length, plasma estradiol-17β and plasma progesterone during pregnancy in Ossimi and Rahmani ewes.

Independent variable	No.of ewes.	L.S.M. ± S.E.	No.of estimation	L.S.M. ± S.E.	
		Gestation length (days)		Estradiol-17β "E_2" "pg/dl"	Progosterone "P_4" "ng /ml"
Breed:					
Ossimi	18	150.94±0.15	144	149.1±0.62	13.03±0.12
Rahmani	24	149.49±0.11	192	158.0±0.45	14.21±0.09
Parity No.:					
1 st parity	13	149.76 ± 0.28^{ab}	104	175.56 ± 0.23^{b}	11.76 ± 02.3^{b}
2 nd parity	12	150.89 ± 0.18^{a}	96	117.29 ± 0.71^{b}	14.14 ± 014^{a}
3 rd parity	8	149.94 ± 0.21^{b}	64	259.85 ± 0.86^{a}	12.82 ± 0.17^{ab}
4 th parity	9	150.25 ± 0.34^{ab}	72	187.80 ± 1.37^{b}	15.92 ± 027^{ab}
Sex of feti:					
Male	20	150.55 ± 0.20^{b}	160	146.33 ± 0.81^{b}	14.98 ± 0.16^{a}
Female	15	151.04 ± 0.17^{a}	120	129.79 ± 0.69^{b}	12.67 ± 0.13^{b}
Male and female	7	149.05 ± 0.25^{c}	56	87.69 ± 0.99^{a}	13.32 ± 0.19^{b}
Type of feti:					
Single	31	150.41±0.15	248	137.12±0.61	11.97±0.12
Twins	11	150.01±0.21	88	171.09±0.86	15.44±0.17
Overall mean	42	150.21±0.13	336	153.20±0.53	13.62±0.15

a, b, c, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table(5). Least square mean ± standard error of estradiol- 17β (E_2) and progesterone (P_4) during pregnancy in Ossimi and Rahmani ewes.

Days of Pregnancy	LSM ± SE			
	Estradiol- 17β(E_2) pg/dl		Progesterone (P_4) ng/ml	
	Ossimi	Rahmani	Ossimi	Rahmani
10 days	54.32±1.40	9.08±1.18	4.41±0.27	2.56±0.23
20 days	80.82±1.40	39.19±1.18	6.97± 0.27	5.15±0.23
30 days	83.91±1.40	52.13±1.18	6.66±0.27	6.60±0.23
50 days	99.80±1.40	82.81±1.18	8.53±0.27	9.55±0.23
100 days	115.56±1.40	112.15±1.18	13.10±0.27	14.14±0.23
120 days	181.44±1.40	242.74±1.18	22.85±0.27	29.81±0.23
140 days	354.19±1.40	508.05±1.18	46.65±0.27	55.80±0.23
145 days	366.72±1.40	685.91±1.18	11.77±0.27	15.29±0.23

Table: (6) F-ratio of analysis of variance for factors affecting gestation length, estradiol-17β and progesterone levels during pregnancy in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio		
		Gestation length (days)	Estradiol-17β (pg /dl)	Progesterone (ng / ml)
Breed	1	62.16 ***	0.01	0.02
Days of pregnancy/ breed	14	-	30.53 ***	51.71 ***
Parity No.	3	7.45 ***	12.50 ***	1.05
Sex of feti	2	18.54 ***	2.01	1.67
Type of feti	1	1.60	1.18	3.56
Regression on age of ewe:				
linear	1	1.99	3.81 *	3.03
Quadratic	1	2.38	2.82	5.76 **
Regression on body weight of ewe:				
Linear	1	3.24	10.05 ***	2.30
Quadratic	1	2.06	11.61 ***	3.06
Remainder d.f	310			
Remainder MS		1.98	32.34	1.25

* = $p< 0.05$, ** = $p< 0.01$ and *** = $p< 0.001$

4.1.5: Regression on age and body weight of ewe:

Also , obtained data showed that regression of gestation length on both of age of ewe and body weight of ewe were statistically insignificant with linear and quadratic trend . Results obtained agreed with those obtained by **EL- Sayed (1988)** who reported that average of gestation length was found to decrease as ewes body weight increased and, **Southan *et al.*, (1971) Dyrmundsson and Less (1972) Suliman *et al.*, (1978) and Gorden (1983)** found that the length of gestation period in ewe lambs appeared to be similar to, or, in same cases , somewhat shorter than that observed in yearling and adult ewes .

4.2: The hormonal pattern during pregnancy period :

Plasma sexual hormone (estradiol – 17β and progesterone) as well as plasma thyroid hormones (T3 and T4) levels were estimated in experimental Ossimi and Rahmani ewes at 10,20,30,50, 100,120, 140 and 145 days of the pregnancy period .

4.2.1: Sexual hormones (progesterone P_4 and estradiol –17β E_2):

Data presented in table (4) show the means of plasma level of progesterone and estradiol –17 β along the pregnancy period as affected with the various factors studied.

4.2.1.1: Effect of breed:

It was found that Ossimi ewes had lower level of both sexual hormone (progesterone, 13.03ng/ml and estradiol –17β149.1 pg/dl) than Rahmani ones 14.21 ng/ml and 158.0 pg/dl, respectively) . However , analysis of variance did not show any significant differnce in either the two hormones due to the ewe's breed (Table 6). Obtained results are in agreement with those obtained by **Rhind *et al.*, (1983) , Kudari (1992)**

and EL-Sayed and Abdel –Ghaffar (1998) who found no significant variation between breeds in blasma estradiol –17β and progesterone profiles .

4.2.1.2 Effect of days of pregnancy:

Data listed in Table (5) and Figures (1 and 2) show the plasma least square mean of both progesterone and estradiol - 17 β for either Ossimi and Rahmani ewes differing in the days of estimation (at 10, 20, 30, 50, 100, 120, 140, and 145 days) of pregnancy period.

Great variation was obtained in the values of plasma progesterone and estradiol -17 β level along the pregnancy period (Table 5).Plasma progesterone level increased gradually as pregnancy time passed reaching its maximum level at the 140th day of the pregnancy period (55.80 ng/ml) in Rahmani and 46.65 ng/ml in Ossimi , respectively then decreased during the last 5 days reaching a value of 15.29 ng/ml and 11.77 ng/ml in Rahamai and Ossimi which was twice the value estimated at the 30th day (6.60 ng/ml) in Rahmani and 6.66 ng/ml in Ossimi . Plasma progesterone level by this manner goes in a harmony with that of the plasma estradiol - 17 β, which through a light on the mechanism of the hormonal coordination causing labor.

Obtained results concerning progesterone level in ewes during pregnancy agree with the finding of **Bassett and Thorburn (1973)** found that , progesterone level usually declined in maternal plasma over 7 to 15 days befor the end of gestation period . However , **Gamal (1986)** in Ossimi ewes found that, plasma progesterone concentration increased gradually towards the end of the pregnancy period in Ossimi ewes

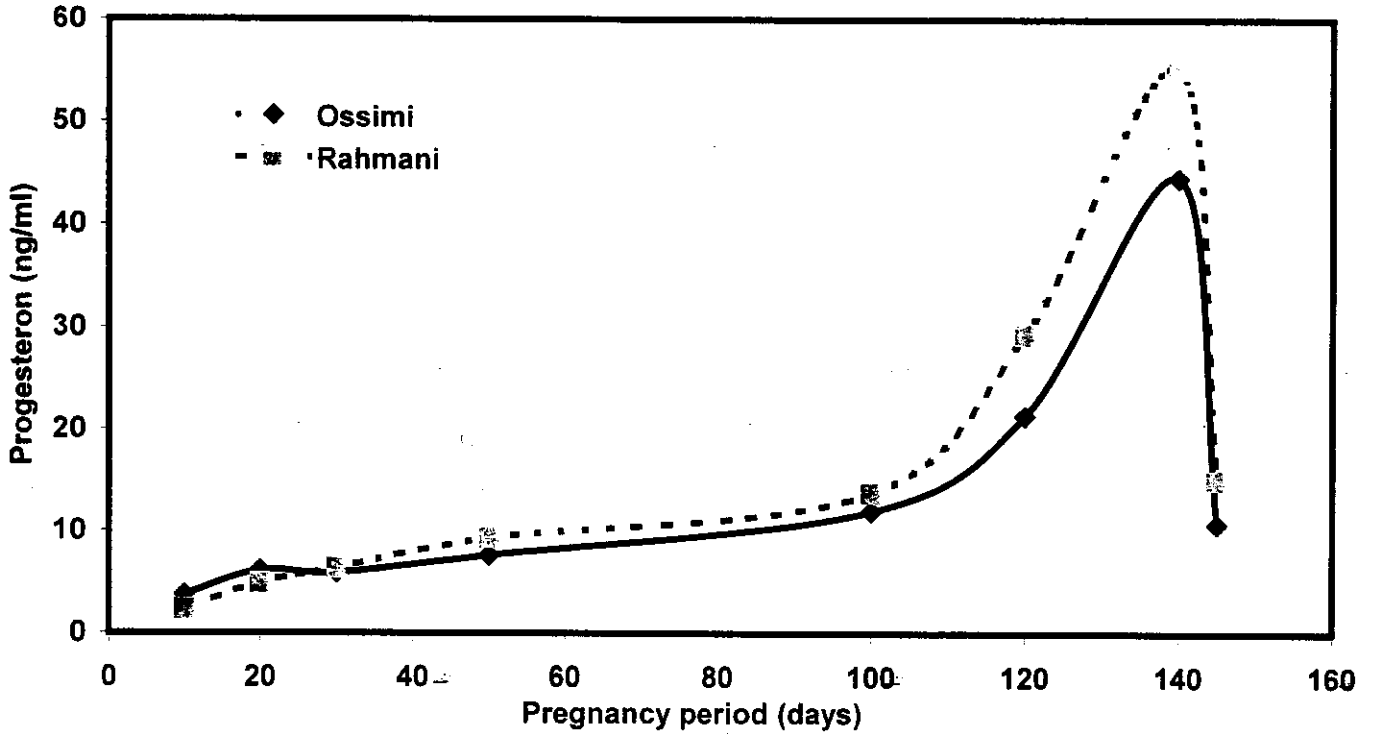

Figure (1): Plasma concentration of progesteron (ng/ml) during pregnancy period for Ossimin and Rahmani ewes.

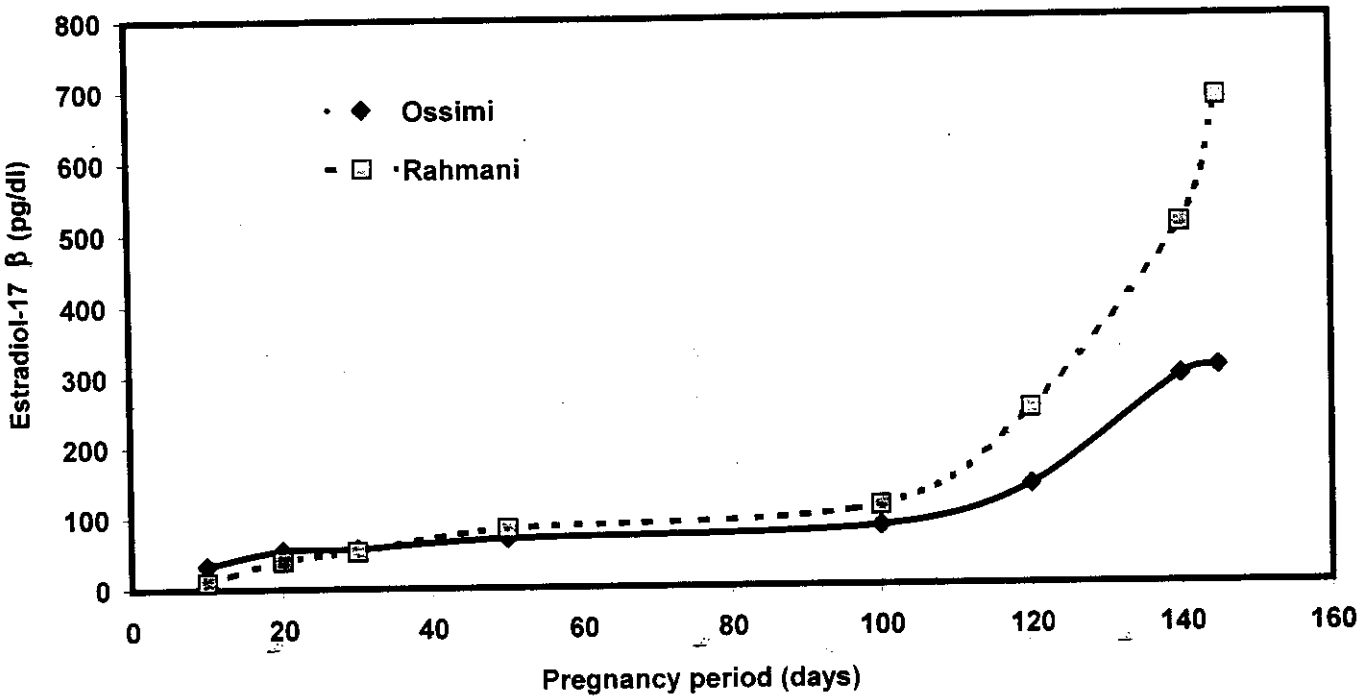

Figure (2): Plasma concentration of estradiol-17 β (pg/dl) during pregnancy period for Ossimi and Rahmani ewes.

reaching its maximum level at 150th day. The rate of increament differed obviously and significantly according to the parity number. Also, **Kudari (1992)** in Ossimi and crossbred ewes found that the progesterone level increased as pregnancy time passed reaching its maximum level at the 120th day of the pregnancy period (35.09 ng/ml) then decreased during the last 30 days reaching a value of 18.14 ng/ml. Moreover, obtained results go with harmony with the finding of **El- Sayed and Abdel-Ghaffar (1998)** who stated that plasma progesterone profile significantly increased gradually as pregnancy passed, beginning from the day of serving (0.29 ng/ml), reaching its maximum at 120th day of gestation (55.87 ng/ml), then sharply dropped during the 145th day of pregnancy (11.94 ng/ml), then decreased during the day of birth (2.56 ng/ml).

Plasma estradiol-17 β level increased as time of pregnancy passed reaching its maximum value of 685.91 and 366.72 pg/dl in Rahmani and Ossimi ewes , respectively at the 145th day of the pregnancy period (table 5 and figure 2). The greater rate increase occurred during the last 45 days of pregnancy period (from 100th to 145th days) . During this period the plasma estrogen level increased from 112. 15 and 115.56 pg/dl at the 100th days to 685.91 and 366.72 pg/dl at the 145th day in Rahmani and Ossimi ewes , respectively . These results may support the suggestion that estradiol-17β level must increase during the second trimester of the pregnancy period to increase the sensitivity of the uterus of the pregnant ewe to the autonomic nervous system stimulation resulted from various neuro – hormonal action and thus facilitates the parturition process . This agree with the finding of **Davies and Ryan (1972) , Anderson *et al.*,**

(1975) and Steele *et al.*, (1976) who found that, the prepartum estrogen surge is a result of the foetal glucocorticoids which induces enzymes capable to convert progesterone to estrogen. Thus the decline in placental secretion of progesterone and the increase in estrogens production in sheep are intimataly related within the placenta and controled by the foetal adrenal cortex (**Challis *et al.*, 1977)** . This go in a harmony with **Liggins *et at.*, (1972)** who stated that foetal pituitary adrenal axis plays a key role in signalling the initiation of labor in sheep .Also, **Challis (1971), Thorburn *et al.*, (1972) , Bassett and Thorhurn (1973) Currie *et al.*, (1973) , Robertson and Smeaton (1973) , Cox (1975), Boulfehar and Brudiendieux (1980) Gamel (1986) Salem *et al.*, (1986)and EL-Sayed (1988), Hamone and Heap (1990), Kudari (1992), Manalu *et al.*, (1996) and El- Sayed and Abdel – Ghaffar (1998),** found that in ewes , the production of estrogen and progesterone during pregnancy , continues to rise throughout most of the pregnancy period which is quite typical to findings of the present work. **Robertson and Smeaton (1973); Tsang (1978); Rawlings and Ward (1978) and Hamon and Heap (1990)** added that the level of estradiol - 17β was doubled at the last 24 hours befor delivery. **EL-Sayed (1988)** found that plasma estradiol -17β level was significant affected by the pregnancy time .Also, **Kudari (1992)** reported highly significant ($p< 0.001$) variation for estradiol - 17β and progesterone due to the effect of time of pregnancy. Obtained result go with harmony with the finding of **EL sayed and Abdel Ghaffar (1998)** with Ossimi and Rahmani ewes who found that plasma estradiol - 17β level decreased significantly at the 10^{th} day after mating (23.66 pg/ml), compared to the day of mating (206.41pg/ml), then it gradually

but non significantly increased during the 15th , 20th ,30th and 60th days of gestation (52.91- 87.89 pg/ml), followed by a sharp significant increase at 120th day of pregnancy (190.37pg/ml). The maximum concentration of this hormone occurred during 145th day of gestation (379.10pg/ml) and the day of birth (404.90 pg/ml).

4.2.1.3 Effect of ewe's parity number:

Table (6) showed that ewe's parity significantly ($p< 0.001$) affected the level of estradiol-17 β in blood plasma only .While no significant effect was found due to this factor on the plasma progesterone level.The level of plasma progesterone in ewes showed different trend .Its value did not vary greatly. It ranged from 11.76 ng/ml in ewes of 1st parity to 15.92 ng/ml in ewes having 4th parities. The highest value of plasma estradiol -17 β level (259.85 pg/dl) was estimated in ewes having 3 parities. While the lowest plasma estradiol -17 β (117.29 pg/dl)in ewes having 2 parities .Estradiol-17 β increased signicantly in 3rd parity (259.85 pg/dl)compared with other parities , while , no different significant between 1st , 2nd and 4th parities (175.56, 117.29 and 87.80 pg/dl), respectively . The significant variation in plasma estradiol -17 β level due to the ewes parity may be due to the changes occurred in the physiological status as the ewe grew older which is closely related with the degree of the optimal coordination between hormonal activity of pituitary and gonads . On the other hand the insignificant variation found in plasma progesterone level due to ewe's parity may lead to suggest that the amount of progesterone secreted during the pregnancy period is not correlated with the amount of estradiol -17 β level .It is quite true since the site of secretion is different in the two hormones . In addition

variation in the placental secretion of progesterone during the second trimester of pregnancy may be a main reason in this aspect.

Obtained results go in harmony with the finding of **Kudari (1992)** who found that ewe's parity significantly affected the level of estradiol - 17 β in blood plasma, while no significant effect was found due to parity number on the plasma progesterone level. However, **El-Sayed (1988)** showed, no significant variation in plasma estradiol- 17 β during pregnancy period due to the parity number. In this respect, **El-Sayed and Abdel- Ghaffar (1998)** reported that ewe's parity had a significant effect on the level of both of estradiol-17 β and progesterone during pregnancy period.They found that the highest value of plasma estasiol-17 β concentration (250.71 ng/ml) was estimated in ewes having 3 parities followed by those of the 1st and 4 th parities (165.79 and 162.28 pg/ml, respectively). The lowest level of this hormone occurred in ewes of the second parity (81.30 pg/ml). The highest level of plasma progesterone content was found in ewes of two and four parities (18.22 and 16.75 ng/ml, respectively).

4.2.1.4: Effect of sex of feti:

Obtained results in table (4) showed that ewes having male feti had highest ($p<0.05$) plasma progesterone level (14.98 ng/ml) than those having either female feti (12.67 ng/ml) or twins of male and female (13.32 ng/ml). Quite different results were found concerning plasma estradiol-17 β level. Ewes having female feti had the lowest mean of plasma estradiol - 17 β (126.79 pg/dl) when compared with those having male feti (149.33 pg/dl) or twins of male and female feti (187.69 pg/dl). However , analysis of variance showed insignificant effect of the sex of

feti on the level of either plasma progesterone or estradiol -17β (Table 6). **El-Sayed (1988)** found no siginificant effect of plasma estradiol-17 β due to sex of embryo during pregnancy period. Also, **Kudari (1992)** showed the same results for both of estradiol-17 β and progesterone. However, **El-Sayed and Abdel-Ghaffar (1998)** reported that the sex of feti had no significant effect on the level of estradiol-17 β ; but a significant effect on plasma progesterone. They added that, ewes having male and femal feti had plasma estradiol-17 β (208.76 pg/ml) higher than those of male (147.26 pg/ml) or female (139.04 pg/ml) feti. While, they found that, ewes having male feti had plasma progesterone (20.82 ng/ml) higher than those of female feti (13.37 ng/ml) or twins of male and fmale feti (15.79 ng/ml).

4.2.1.5: Effect of type of feti:

The great difference in the means of both hormones between ewes of single embryo or twins could not be physiologically neglected . It was found that the levels of both hormones were higher in ewes having twins than those of a single feti. Means of plasma progesterone and estradiol -17β were (15.44 ng/ml and 171.09 pg/dI) in ewes of twins, respectively , while the corresponding values were 11.97ng/ml and 137.12 pg/dI in those of a single feti, respectively. Analysis of variance showed insignificant effect of the type of feti (single or twins) on the level of either plasma progesterone or estradiol- 17β (Table 6) . It was known for long time of age that the twining is a result of either formation of more than one ovum or more than one feti from one fertilizer ovum. In this case, whatever the reason is, the site of the sexual hormonal secretion (granulosa cells of the two ovarian follicles ,

The leuteal cells of the two corpora lutea formed or the two placental tissues of the two embryo developed) is duplicated .Results obtained agree with that statement . However ,the statistical results may be a function of the great variation found in the number of animal or samples of the two groups of ewes (248 and 88 in single feti and twins , respectively).

Bassett *and Thorburn*(1973); Gadsby *et al.*, (1972) and **Novoa (1986)** indicated that circulating progesterone hormone was always found to be closely related to either number of corpora lutea during early pregnancy or with number of fetuses during the late stages . **Bassett and *Thorburn.*, (1969); Stabenfeldt *et al.*,(1972); Novoa (1986) and Hamon and Heap (1990)** found that ewes having a single fetus had a lower progesterone concentration compared to those having twins .

However, **Manalu and Sumaryadi (1998)** found no difference in serum progesterone concentration among ewes carrying 1,2 and 3 fetuses during weeks 0 – 7 of pregnancy (5.3, 6.2 and 6.6 ng/ml, respectively). In another studies, **Manalu *et al.*, (1996)** showed that the average serum progesterone concentration during the last two months of the gestation period in the twin bearing does increased ($P < 0.01$) by 91.9% as compared to those in the single bearing does (11.11 vs. 5.79 ng/ml) .

Also, **Ranilla *et al.*, (1996)** reported that the mean progesterone values varied significantly ($P < 0.01$) with the number of fetuses, and the interaction of number of fetuses and time of gestation tented to be significant . In this respect , **Schneider and Hallford (1996)** showed that, serum progesterone concentration was compared with lamb in data to assess its accuracy for pregnancy diagnosis and prediction of number

of lambs. They found that ewes with progesterone concentration 2.5 ng/ml had 1 lamb and ewes with > 11 ng/ml had multiple lambs. **El Sabbagh (1998)** found that, the level of progesterone in case of crossbred ewes (Rahmani X Ossimi) carried two foeti was significantly ($P < 0.05$) higher than that in ewes carried one foetus at 7^{th} , 15^{th} day and first trimester of pregnancy.

It was found by **Kudari (1992)** that the levels of both hormones were approximately twice in ewes having twins than those of a single embryo . Also , the same finding was obtained by **El-Sayed and Abdel – Ghaffar (1998)** for progesterone profile , however , in case of estradiol – 17β they found that , there was a nonsignificant increase in plasma estradiol – 17β in ewes having single feti (189.50 pg/ml) over those having twins (140.54 pg/ml) .

4.2.1.6 : Regression on age and body weight of ewe :

Obtained data (table 6) showed that regression of both the two sexual hormones on age of ewe are significant ($P < 0.05$ for estradiol – 17β and $P < 0.01$ for progesterone with linear and quadratic trend , respectively). However , in case of the regression of estradiol 17β on ewe's body weight were highly significant ($P < 0.01$) with linear and quadratic trend. Which explain that these traits were significantly dependent upon age of ewe (for estradiol – 17β and progesterone) and ewe's body weight (for estradiol – 17β only).

El–Sayed (1988) , Hunaiti *et al.*, (1989) and Kudari (1992) indicated that there was no significant variation in the serum estrogen and progesterone level due to the ewe's weight during pregnancy .

4.2.2:Thyroid hormones (T_3andT_4) level in blood plasma:

Least squares means of factors affecting plasma T_3 and T_4 level along the pregnancy period are listed in Table (7).

4.2.2.1 Effect of breed :

It was found that Rahmani ewes had higher (69.07 ng/dl) T_3 and (5.58 µg/dl) T_4 means than Ossimi ones (66.37 ng/dl) T_3 and (5.40 µg/dl) T_4 , respectively (Table 7). Analysis of variance did not show any significant variation in either plasma level of T_3 and T_4 due to effect of breed (table 9). These results go in agreement with the finding of **Kudari (1992)** who found no differences in plasma level of T_3 and T_4 during pregnancy due to effect of breed. It could be concluded that secretion rate of T_3 and T_4 have been reported to be affected by the reproductive status **(Mourad *et al.*,1981 and Pichaicharnarong *et al.*, 1982, Kudari, 1992).**

4.2.2.2: Effect of days of pregnancy:

Data listed in Table (8) and figures (3 and 4) show that the mean of both plasma T_3 and T_4 for either Ossimi and Rahmani ewes differed in the period of pregnancy. Plasma triiodothyronine (T_3) level decreased up to 50th day of the pregnancy period (from 73.99 and 82.45 ng/dl at the 10th day to 57.70 and 56.57 ng/dl at the 50th day in Ossimi and Rahmani ewes , respectively) then it sharply increased reaching a level of 79.17 and 87.38 ng/ml at the 145th day of pregnancy period . Different trend was met in plasma thyroxin (T_4) levels . It decreased from 6.33 and 6.21 at the 10th day to 4.67 and 4.96 µg/dl at the 50th day ; and it increased to 5.89 and 6.21 at the 140th days in Ossimi and Rahmani, respectively .

Table: (7) Least squar means ± standard error (LSM±SE) of factors affecting plasma triiodothyronine and thyroxin during pregnancy in Ossimi and Rahmani ewe.

Independent variable	No. of ewes	No.of estimation	LSM±SE	
			Triiodothyronine (ng/dl)	Thyroxin (µg/dl)
Breed:				
Ossimi	18	144	66.37±2.53	5.40±0.10
Rahmani	24	192	69.07±1.86	5.58±0.10
Parity No.:				
1 st parity	13	104	91.42±4.68^{a}	5.46±0.18^{a}
2 nd parity	12	96	63.90±2.92^{b}	5.45±0.11^{a}
3 rd parity	8	64	57.25±3.53^{bc}	5.61±0.14^{a}
4 th parity	9	72	58.32±2.62^{c}	5.43±0.21^{b}
Sex of feti:				
Male	20	160	63.15±3.31	5.84±0.13^{a}
Female	15	120	66.50±2.82	5.50±0.19^{a}
Male and female	7	56	73.50±4.10	5.12±0.16^{b}
Type of feti:				
Single	31	248	69.39±2.50	5.10±0.10
Twins	11	88	66.05±3.52	5.88±0.14
Overall mean	42	336	67.72±2.19	5.19±0.10

a, b, c, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table: (8): Least square mean ± standard error (LSM ± SE) of triiodothyronine (T_3) and thyroxin (T_4) during pregnancy in Ossimi and Rahmani ewes.

Days of pregnancy	LSM ± SE			
	Triiodothyronine (T_3) (ng / dl)		Thyroxin (T_4) (µg / dl)	
	Ossimi	Rahmani	Ossimi	Rahmani
10 days	73.99±5.74	82.45±4.83	6.33±0.22	6.21±0.19
20 days	69.10±5.74	74.10±4.83	5.60±0.22	5.32±0.19
30 days	59.61±5.74	63.61±4.83	5.87±0.22	6.12±0.19
50 days	57.70±5.74	56.57±4.83	4.67±0.22	4.96±0.19
100 days	59.35±5.74	56.74±4.83	4.83±0.22	5.07±0.19
120 days	65.77±5.74	69.12±4.83	5.09±0.22	5.24±0.19
140 days	66.25±5.74	62.61±4.83	5.89±0.22	6.21±0.19
145 days	79.17±5.74	87.38±4.83	4.95±0.22	5.08±0.19

Table: (9) F-ratio of analysis of variance for factors affecting triiodothyronine and thyroxin during pregnancy in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio	
		Triiodothyronine (T_3) (ng/dl)	Thyroxin (T_4) (μg/dl)
Breed	1	0.20	0.26
Days of pregnancy /breed	14	3.83 ***	8.34 ***
Parity No.	3	11.30 ***	0.44
Sex of feti	2	1.40	5.18 ***
Type of feti	1	0.42	15.08 ***
Regression on age of ewe:			
linear	1	9.02 ***	3.44
quadratic	1	10.13 ***	10.20 ***
Regression on body weight of ewe:			
linear	1	11.16 ***	15.53 ***
quadratic	1	10.72 ***	12.56 ***
Remainder :d.f	310		
Remainder :MS		545.79	0.82

*** = P< 0.001

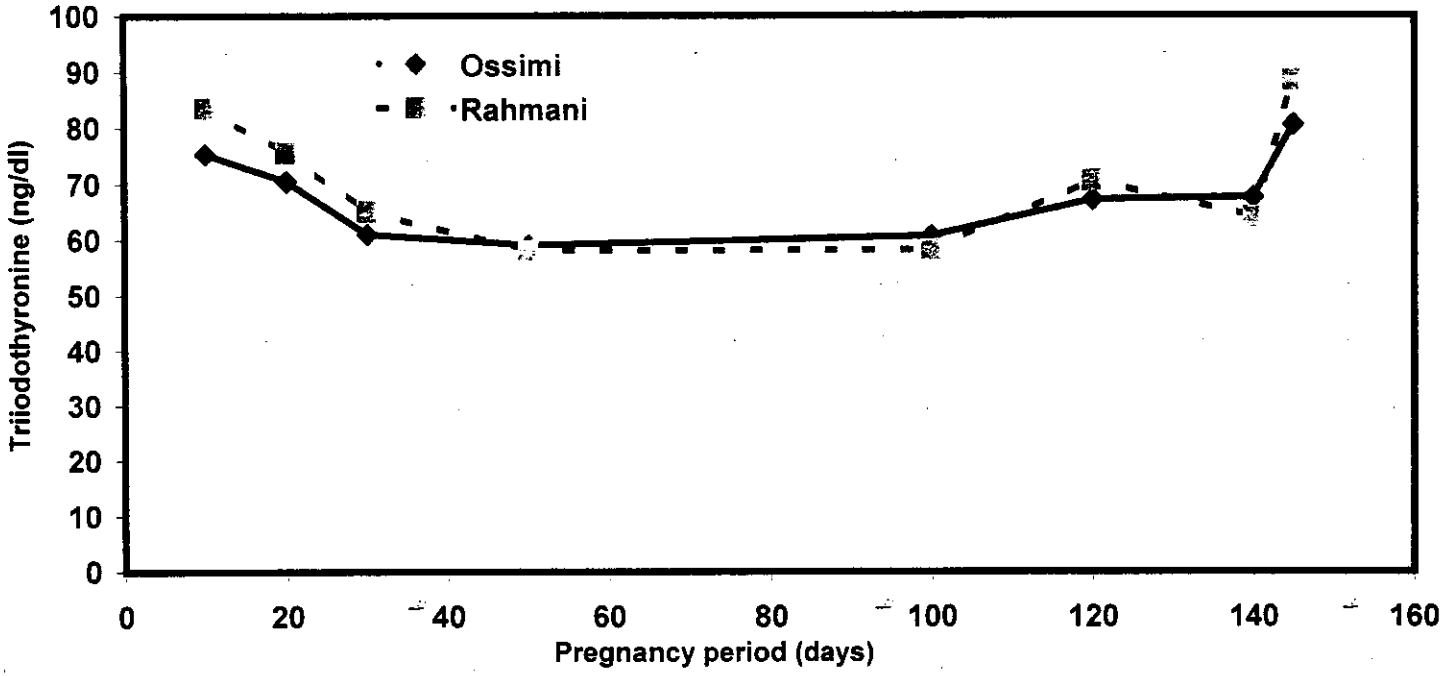

Figure (3): Plasma concentration of triiodothyronine (ng/dl)during

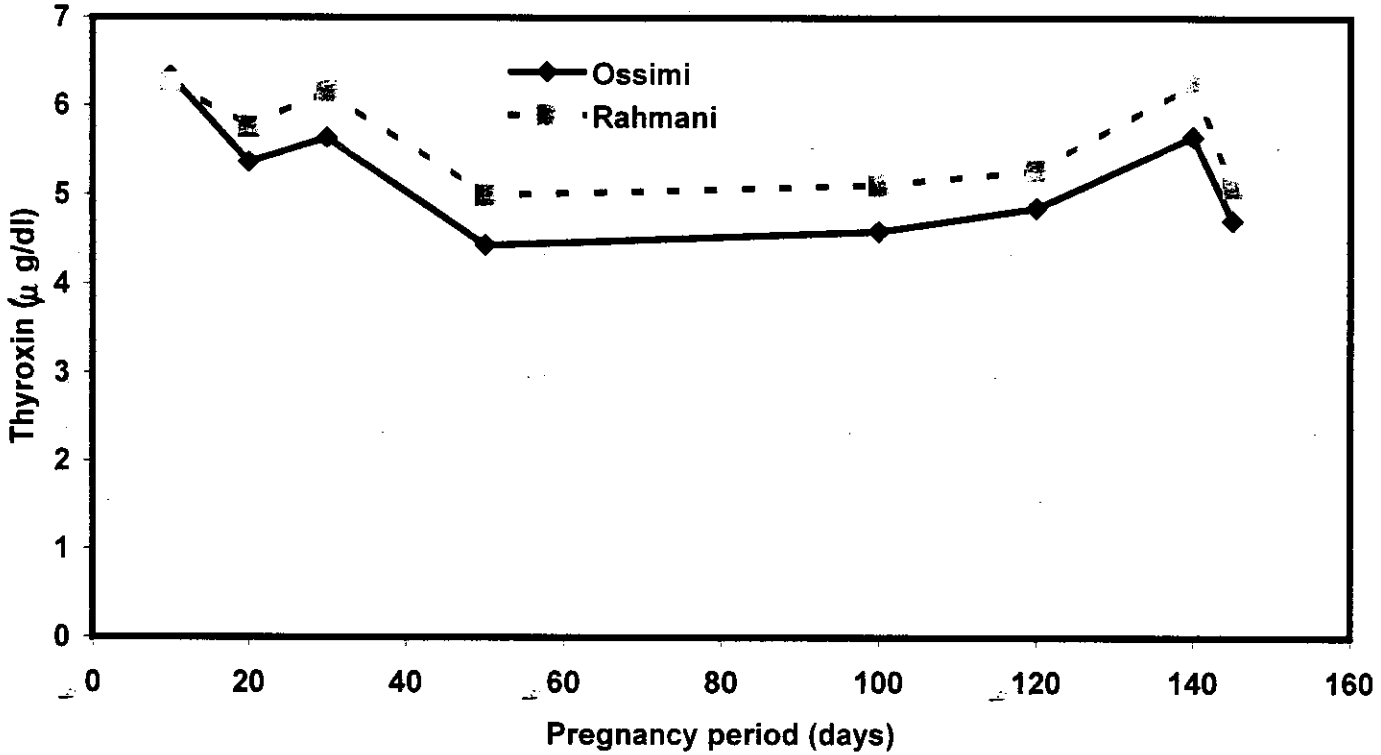

Figure (4): Plasma concentration of thyroxin (μg/dl) during pregnancy period for Ossimi and Rahmani ewes.

Plasma T_4 level decreased to 4.95 and 5.08 µg/dl in the 145th day, respectively. Analysis of variance showed highly significant variation ($p < 0.001$ and $P< 0.05$) on T_3 and T_4, respectively due to the effect of days of pregnancy (table 9).

These results may be also attributed to the different level of metabolic activity throughout the pregnancy period which depends on the different embryonic needs at different stages of its embryonic development.

The obtained results are in agreement with those found by **Nathanielsz *et al.*, (1973a,b)** who reported that, plasma thyroxin levels Varied Significantly between 2.3 and 4.1 µg/100 ml during the period between 103 days of gestation and the day of birth , while the T_3 concentration continued to rise during the period in which thyroxin concentration fall .Also, the present findings partialy agree , with those of **Salem *et al.*, (1986)** who found that the secretary activity of the thyroid gland was higher during the last stage of pregnancy (90 to150days) comparing to those of the early stage of pregnancy. In this respect, **Kudari (1992)** found a significant ($p<0.001$) variation in plasma T_3 and T_4 in Ossimi and Crosses (Rahmani x Ossimi) ewes due to the pregnancy intervals. Plasma T_3 level decreased up to the 90th day of the pregnancy period then it sharply increased reaching a maximum level at the 120th day after which it decreased at the 150th day of the pregnancy period.

4.2.2.3: Effect of parity number of ewe:

Plasma T_3 level decreased significantly ($p <0.001$) with increasing ewe's parity (table 7).T_3 level decreased from (91.42 ng / dl) in ewe's having 1st parity to (58.32ng/dl) in 4th parity. T_4 levels decreased non

significantly by increasing ewe's parity .The highest levels of T_4 (5.61, µg/dI) in ewes having 3rd parity's,. However, the lowest levels (5.44 µg/dl) in ewes having 4th parity. Analysis of variance showed high significant effect of parities on plasma T_3 and non significant on T_4 level (Table 9). The decrease in the level of plasma thyroid hormone with increasing the ewe's parity may lead to suggest that ,this may be due to either decreasing level of thyroid activity as the ewe's grew older or to the increasing level of the metabolic processes to face the increasing demand for energy with age that accelerates the rate of thyroid hormones metabolism (break down) which results in decreasing their level in plasma .

It was found by **Kudari (1992)** that ewe's breed showed its significant ($p<0.05$) effect on both the two thyroid hormones when interacted with ewe's parity. Also, he found that there were highly significant variation in both plasma T_3 ($p<0.001$) and T_4 ($p<0.01$) levels due to ewe's parity.

4.2.2.4: Effect of sex of feti:

The highest level of plasma T_3 level (73.50 ng/dI) was found in ewe's having twins (male and female) feti, while those having female and having male were found to be 66.50 and 63.15 ng/dl, respectively . While, the highest level of plasma T_4 (5.84 µg/dl) was found in ewes having male feti , compared with 5.50 and 5.12 µg/dl in ewe's having female and both male and female , respectively (table 7). .Analysis of variance did not showed significant with sex of feti on T_3 , however, analysis of variance showed significant ($P<0.001$) effect of sex of feti on plasma T_4 level only (table 9).It was found by **Nathanielsz *et al.*,**

(**1973a,b**) that embryo starts to secrete its own thyroid hormones at about 50 days of its embryonic development period ,and there is a high rate of fetal T_4 secretion during the last trimester of gestation (**Dussault *et al.*, 1971**) . Also, **Comline *et al.*, (1969)** reported that, the foetus appears to lose negligible amounts of thyroxine level is 1.5 to 2.0 times higher than the absolute level in the ewe. **Kudari (1992)** with Ossimi and Crossbred ewes showed significant ($P<0.001$) variation in plasma T_3 level only due to the sex of embryo. And he showed a significant ($P<0.001$) effect on plasma T_3 level only due to the interaction between periods of pregnancy and sex of embryo. This result indicats the change in thyroid activity according to the physiological status of the ewe.

4.2.2.5: Effect of type of feti:

Ewes having single had higher values of T_3 level compared with twins (69.39 v.s 66.05 ng/dI, respectively). However , the T_4 levels concentration was higher (5.88 ug/dI) in ewes having twins compared with (5.10 ug/dI) ewes having single feti. Variation in plasma T_3 did not show significance, while , variation in plasma T_4 showed highly significance ($p<0.001$) due to the effect of type of feti (table 9). These results are quite scientifically logic since it was found that all metabolic processes are accelerated in case of twining . In additation the amount of embryonic thyroid hormone which may be transferred to the maternal circulation may be involved in this aspect .

Kudari (1992) found that ewe's breed showed its significant ($p< 0.001$) effect on plasma T_4 level when interacted with type of embryo. Also, he showed a significant ($p<0.001$) effect only for plasma T_3 level due to the interactions between periods of pregnancy and type of embryo.

4.2.2.6: Regression on age and body weight of ewe:

Obtained data (table 9) indicate that, the linear and quadratic regression of both thyroid hormones (T_3 and T_4) on age of ewe and also on weight of ewe were statistically highly significant ($p<0.001$). This result may emphasize the importance of ewe's body weight for increasing the metabolic processes during pregnancy period. These results are in agreement with those found by **Kudari (1992)** with Ossimi and crossbred ewes who showed that the linear and quadratic regression of both thyroid hormones (T_3 and T_4) on weight of ewe during pregnancy period are significant ($p<0.05$ and $p<0.01$, respectively). **Anderson *et al.*, (1972)** suggested that the thyroxin secretion rate of large animal may be related to body weight, so, the heavier animals need more thyroxin secretion rate per body weight. In this respect, **Mixner, *et al.*, (1966)** reported that 1% increased in body weight results in 0.64% increase in thyroid secretion rat. Also, **Ibrahim *et al.*, (1993)** showed that, level of thyroxin (T_4) in blood plasma of Ossimi and crossbred lambs increased with advancing age **(Mixner *et al.*, 1966 and Kahl and Bitman, 1983).**

4.3:Concentration of some blood plasma components in ewes during pregnancy .

4.3.1: Proteins fractions :

4.3.1.1.: Effect of breed:

Data presented in Table (10) show that the two breeds (Ossimi and Rahmani) showed similar mean of plasma total protein (7.00 vs 6.97 gm/dl, respectively). Analysis of variance did not show any significant variation due to the effect of breed group (table 12).

The obtained results, go in agreement with that found by **EL-Ghoneimy, (1994)** who found that there was no significant differences due to breed of sheep in total protein . The mean levels of total protein in this experiment are similar to that obtained by **Rizk (1999)** in Rahmani ewes wich was 7.09 gm/dl in pregnancy period higher than that obtained by **Shetaewi , *et al.*, (1991)** in Saidi lambs which was 6.38 gm/dI.

Similarly, plasma albumin and A/G ratio increased in Ossimi ewes compared with Rahmani ewes, while plasma globulin decreased in Ossimi compared with Rahmani. Analysis of variance showed non significant breed effect on the level of albumin, globulin and A/G ratio as presented in table (12).This result are in agreement with the finding of **EL–Sheikh, *et al.*,(1981 a and b), EL Ghoneimy, (1994) and Rizk (1999)** who found that there were no significant differences due to breed of sheep Ossimi, Rahmani and Barki in plasma, albumin, globulin and A/G ratio.

4.3.1.2: Effect of days of pregnancy:

The effect of days of pregnancy was significant ($p < 0.001$) on total protein and albumin levels and non significant on plasma globulin and A/G ratio (Table 11). The plasma total protein decreased from 10 days of pregnancy (7.62 and 7.58gm/dI) to (6.75 and 6.79 gm/dI) in 145 days of pregnancy in Ossimi and Rahmani ewes, respectively (table 11). The higher plasma level of albumin in Ossimi and Rahmani ewes were in 10 days of pregnancy (4.15 and 4.12 gm/dI) and decreased to (3.71 and 3.41gm/dI) in 145 days, and the lower level in 140^{th} days (3.32 and 3.31gm/dl) respectively. The higher levels of plasma globulin were in 10^{th} days and 30^{th} days (3.47 and 3.46 gm/dI in Ossimi and Rahmani

Table: (10) Least square means ± standard error (LSM±SE) of factors affecting plasma total protein, albumin, globulin and their ratio during pregnancy in Ossimi and Rahmani ewes.

Independent variable	No. of ewe	No.of estimation.	LSM±SE			
			Total protein (Tp) (gm/dl)	Albumin (A) (gm/dl)	Globulin (G) (gm/dl)	A/G ratio
Breed:						
Ossimi	18	144	7.00±0.03	3.72±0.09	3.28±0.09	1.13±0.06
Rahmani	24	192	6.97±0.02	3.58±0.06	3.39±0.06	1.06±0.05
Parity No.:						
1 st parity	13	104	6.96 ± 0.06^{a}	3.56 ± 0.16^{ab}	3.41 ± 0.16^{ab}	1.04 ± 0.12^{ab}
2 nd parity	12	96	7.01 ± 0.03^{a}	3.45 ± 0.10^{b}	3.56 ± 0.10^{a}	0.97 ± 0.07^{b}
3 rd parity	8	64	7.04 ± 0.04^{a}	3.87 ± 0.12^{a}	3.17 ± 0.12^{bc}	1.22 ± 0.09^{a}
4 th parity	9	72	6.93 ± 0.07^{b}	3.72 ± 0.19^{ab}	3.22 ± 0.19^{c}	1.16 ± 0.14^{a}
Sex of feti:						
Male	20	160	6.95±0.04	3.40 ± 0.11^{b}	3.54±0.11	0.96±0.08
Female	15	120	6.99±0.03	3.62 ± 0.10^{ab}	3.37±0.09	1.07±0.07
Male and female	7	56	7.02±0.04	3.92 ± 0.14^{a}	3.10±0.14	1.41±0.10
Type of feti:						
Single	31	248	6.98±0.03	3.72±0.08	3.26±0.09	1.30±0.06
Twins	11	88	6.99±0.04	3.58±0.12	3.41±0.12	1.16 ± 0.09
Overall mean	42	336	6.99±0.03	3.65±0.07	3.34±0.07	1.09±0.06

a, b, c, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table: (11) . Last square mean + standard error (LSM ± SE) of total protein, albumin, globulin and their ratio during pregnancy in Ossimi and Rahmani ewes.

Days of pregnancy	LSM ± SE							
	Total protein (Tp) (gm/dl)		Albumin (A) (gm/dl)		Globulin (G) (gm/dl)		A/G ratio	
	Ossimi	Rahmani	Ossimi	Rahmani	Ossimi	Rahmani	Ossimi	Rahmani
10 days	7.62±0.07	7.58 ±0.06	4.15±0.19	4.12±0.16	3.47±0.20	3.46±0.17	1.20±0.15	1.91±0.12
20 days	7.36±0.07	7.28 ±0.06	3.92±0.19	3.89±0.16	3.44±0.20	3.39±0.17	1.14±0.15	1.15±0.12
30 days	7.00±0.07	6.93±0.06	3.63±0.19	3.23±0.16	3.37±0.20	3.70±0.17	1.10±0.15	0.87±0.12
50 days	6.80±0.07	6.99±0.06	3.69±0.19	3.55±0.16	3.20±0.20	3.44±0.17	1.15±0.15	1.03±0.12
100 days	6.91±0.07	6.84±0.06	3.54±0.19	3.75±0.16	3.37±0.20	3.10±0.17	1.05±0.15	1.21±0.12
120 days	6.77±0.07	6.71±0.06	3.76±0.19	3.40 ±0.16	3.00±0.20	3.31±0.17	1.25±0.15	1.03±0.12
140 days	6.69±0.07	6.66±0.06	3.32±0.19	3.31±0.16	3.37±0.20	3.37±0.17	0.99±0.15	0.98±0.12
145 days	6.75±0.07	6.79±0.06	3.71±0.19	3.41±0.16	3.03±0.20	3.38±0.17	1.22±0.15	1.01±0.12

Table: (12) F-ratio of analysis of variance of factors effecting total protein, albumin, globulin and their ratio during pregnancy in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio			
		Total protein (Tp) (gm/dl)	Albumin (A) (gm/dl)	Globulin (G) (gm/dl)	A/G ratio
Breed	1	0.02	0.61	1.12	1.65
Days of pregnancy/ breed	14	27.70 ***	2.69 ***	0.98	1.24
Parity No.	3	1.10	2.76 *	2.37	2.60 *
Sex of feti	2	0.57	3.30 *	2.26	2.55
Type of feti	1	0.10	0.65	0.79	1.09
Regression on age of ewe:					
linear	1	0.18	2.07	1.63	0.77
quadratic	1	0.00	2.35	2.35	1.14
Regression on body weight of ewe:					
linear	1	5.12*	0.00	0.66	0.00
quadratic	1	5.20*	0.06	1.02	0.06
Remainder : d.f	310				
Remainder: MS		0.08	0.63	0.64	0.35

* = P< 0.05 and *** = P< 0.001

ewes, respectively) , and decreased gradually reaching the lowest mean levels in 120th and 100th days (3.00 and 3.10 gm/dl) in Ossimi and Rahmani, respectively. The A/G ratio was (1.22) in 10th days in both Ossimi and Rahmani and increased in 120th days of pregmancy in Ossimi (1.55) and (1.41) in Rahmani at 100th days, while it decreased in 145th days (1.49 and 1.22) in Ossimi and Rahmani ,respectively . The present results are in agreement with **Shetaewi and Daghash, (1993)** using Egyptian coarse wool ewes who found that, serum total protein levels fell to as low as 0.679 gm/dl between day-90 and -21 in the prgenant (0 = time of parturation day) (7.15 to 6.48 gm/dl) and agrees with the finding of **Rizk (1999)** who found that the month of pregnancy had a significant ($p < 0.001$) effect on levels of total protein and non significant on plasma globulin and Albumin/globulin ratio.

4.3.1.3: Effect of parity number of ewe:

Data presented in Table (12) show that the effect of parity number on total protein and globulin was non significant .Mean of plasma total protein of the 1st , 2nd , 3rd and 4th parity were 6.96, ,7.01, ,7.04 and 6.93gm/dl respectively (table 10). The present results are in agreement with that found by **Rizk (1999)** who stated that the mean of plasma total protein of the 1 st parity of Rahmani ewes during pregnancy period was higher than mean level of 4th parity (7.54 vs 6.78 gm/dl). The highest ($p< 0.05$) plasma albumin mean was in 3rd parity (3.87gm/dl) and lowest mean level in the 2nd parity (3.45 gm/dl).The differences between plasma albumin means and A/G ratio due to the effect of parity number of ewe are significant ($p<0.05$) during pregnancy period (table 12). These results disagree with the finding of **Rizk (1999)** who found non significant effect

on albumin levels during pregnancy period due to the effect of parity number. The plasma globulin level decreased in ewes of 3rd parity (3.17gm/dl), while it increased in ewes of 2nd parity (3.56 gm/dl). These levels are less than the levels reported by **Osbladiston (1972) and Hallford and Galyean (1982)** as mean levels were 4.2 and 4.1 gm/dl respectively. However, it was more than the finding of **Rizk (1999)** on Rahmani ewes, who found that globulin levels were 3.54 and 2.64 gm/dl in the ewes of 3 rd and 2nd parities, respectively. The values of albumin / globulin ratio were found to be 0.97 in ewes of 2nd parity and 1.22 in ewes of 3rd parity. These ratios are somewhat more than the ratio reported by **Abd-Elmoty *et al.*, (1991)** in Ossimi sheep (1.0) and nearly lower (1.5) than the ratio reported by **Usami *et al.*, (1969)** in goats and value of 1.47 found by **Rizk (1999)** on Rahmani ewes.

4.3.1.4: Effect of sex of feti:

The effect of sex of feti on protein fraction levels (Table 12) was not significant in total protein, globulin and A/G ratio .Means of plasma total protein were 6.95, 6.99 and 7.02 gm/dl in ewes having male , femal and twins (male and female), respectively. The means of plasma albumin were 3.40, 3.62 and 3.92 gm/dl in ewes having male , female and (male and female), respectively , and the differences between ewes due to sex of feti on albumin levels were significant ($P<0.05$) during pregnancy period (table 12).While , the plasma globulin levels decreases from 3.54, 3.37 in ewes having male and in ewes having female, respectively, to 3.10 gm /dl in ewes having twins male and female. The corresponding values of albumin /globulin ratio were 0.96, 1.07 and 1.41, respectively. Obtained results go in harmony with the finding of **Rizk (1999)** on Rahmani ewes

who reported non significant variation on plasma levels of total protein, globulin and values of Albumin / globulin ratio due to the effect of sex of feti during pregnancy period.

4.3.1.5: Effect of type of feti:

The effect of type of feti on protein fraction levels (Table 12) was not significant . The plasma total protein and globulin were 6.99 and 3.41 gm/dl in ewes having twins feti respectively compared with 6.98 and 3.26 gm/dl in ewes having single feti, respectively, while albumin levels and values of A/G ratio increases to be 3.72 gm/dl and 1.30, respectively in ewes having single feti compared with ewes having twins feti which were 3.58 gm/dl and 1.16, respectively. The present results are in agreement with that found by **Abd EL All, *et al.*,(1990)** and **Rizk (1999)** who found non significant variations in blood serum protein fractions due to number of given birth.

4.3.1.6: Regression on age and body weight of ewe:

Obtained results showed that the coefficients of linear and quadratic regression equations of the levels of protein fractions on age of ewe during pregnancy were statistically nonsignificant (table 12). These results go with agreement with the findings of **Rizk (1999)** who found that the linear and quadratic regression of the levels of albumin, globulin and values of albumin / globline ratio on age of ewe were non siginificant, while it was significant ($P<0.01$) in case of total protein only. Also, the present results showed that the linear and quadratic regression of the level of total protein on ewe's body weight during pregnancy were significant ($P<0.05$). While, it was not significant in case of other parameters (table 12).

4.3.2: Lipids fractions :

4.3.2.1: Effect of breed :

Data presented in Table (13) show that, Ossimi ewes having higher means of total lipids and cholesterol (309.09 and 127.73 mg/dl) than in Rahmani ewes (308. 48 and 123.81mg/dl),while ,the values of L/C ratio were found to be higher in Rahmani ewes than Ossimi ones, (2.58 vs 2.53), Analysis of variance (Table 15)showed that effect of breed was non significant for lipid fractions. Obtained results showed higher plasma total lipids in Ossimi and Rahmani (309.09 and 308.48mg/dl) ewes than , that obtained by **Rizk (1999)** in Rahmani ewes (288.3mg/dl) during pregnancy period. Also, the present results showed higher plasma cholesterol levels (127.73 and 123.81mg/dl in Ossimi and Rahmani respectively) than those obtained by both of **Shetaewi and Daghash (1993)** in Egyptian coarse wool ewes (118.5mg/dl), **Shetaewi *et al.*,(1992)** in Saidi ewes (61.9 mg/dl), **Daghash *et al* .,(1993)** in Saidi ewes (61.9 mg/dl), and **Rizk (1999)** in Rahmani ewes (128.3mg/dl) during pregnancy period .Also, obtained results showed higher value of total lipid / cholesterol ratio (2.53 and 2.58 in Ossimi and Rahmani ewes respectively) than that reported by **Rizk (1999)** in Rahmani ewes (2.22) in pregnancy period.

4.3.2.2 : Effect of days of pregnancy:

The effect of days of pregnancy period on total lipids, cholesterol and L/C ratio (Table 14) was significant ($P < 0.001$). Total lipids level increased gradually from 10^{th} days of pregnancy from 273.09 and 267.75mg/dl to 342.92 and 338.9 mg/dl in 145^{th} days in Ossini and Rahmani ewes, respectively. Similarly, the levels of cholesterol

Table: (13) Least squar means ± standard error (LSM ± SE) of factors affecting plasma total lipid, cholesterol and their ratio during pregnancy in Ossimi and Rahmani ewes.

Independent variable	No. of ewe	No.of estimation	LSM ± SE		
			Total lipids (L) (mg/dl)	Cholesterol (C) (mg/dl)	L /C ratio
Breed:					
Ossimi	18	144	309.09±2.99	127.73±2.69	2.53±0.05
Rahmani	24	192	308.48±2.20	123.81±1.97	2.58±0.04
Parity No.:					
1 st parity	13	104	285.27 ± 5.53^{b}	125.01 ± 4.96^{b}	2.42 ± 0.10^{a}
2 nd parity	12	96	310.77 ± 3.46^{b}	125.24 ± 3.10^{b}	2.59 ± 0.06^{ab}
3 rd parity	8	64	308.30 ± 4.18^{b}	124.58 ± 3.74^{b}	2.57 ± 0.07^{ab}
4 th parity	9	72	330.81 ± 6.65^{a}	128.24 ± 0.96^{a}	2.63 ± 0.11^{b}
Sex of feti:					
Male	20	160	309.49±3.91	127.35±3.51	2.54±0.07
Female	15	120	303.94±3.34	122.66±2.99	2.54±0.06
Male and female	7	56	312.93±4.81	127.29±4.31	2.58±0.08
Type of feti:					
Single	31	248	312.91±2.95	124.22±2.64	2.61±0.05
Twins	11	88	304.66±4.17	127.31±3.74	2.49±0.07
Overall mean	42	336	308.5±2.59	125.77±2.38	2.56±0.05

a, b, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table: (14) Least square mean ± standard error (LSM±SE) of total lipids, cholesterol and their ratio during pregnancy in Ossimi and Rahmani ewes.

Days of pregnauy	LSM±SE					
	Total lipids (L) (mg/dl)		Cholesterol (C) (mg/dl)		L/C ratio	
	Ossimi	Rahmani	Ossimi	Rahmani	Ossimi	Rahmani
10 days	273.09±6.79	267.75±5.72	93.49±6.09	90.35±5.12	2.92±0.12	2.97±0.10
20 days	287.76±6.79	285.62±5.72	105.55±6.09	105.61±5.12	2.77±0.12	2.72±0.10
30 days	297.31±6.79	294.96±5.72	126.42±6.09	121.83±5.12	2.35±0.12	2.57±0.10
50 days	308.70±6.79	295.42±5.72	134.72±6.09	134.79±5.12	2.36±0.12	2.26±0.10
100 days	322.03±6.79	315.17±5.72	130.98±6.09	122.44±5.12	2.55±0.12	2.59±0.10
120 days	311.31±6.79	331.87±5.72	146.93±6.09	134.56±5.12	2.11±0.12	2.64±0.10
140 days	329.64±6.79	338.17±5.72	148.93±6.09	139.09±5.12	2.28±0.12	2.47±0.10
145 days	342.92±6.79	338.91±5.72	134.79±6.09	141.81±5.12	2.66±0.12	2.43±0.10

Table: (15) F-ratio of analysis of variance for factors affecting total lipids, cholesterol and their ratio during pergnancy in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio		
		Total lipids (gm/dl)	Cholesterol (C) (gm/dl)	L/C ratio
Breed	1	0.00	0.12	0.15
Days of pregnancey / breed	14	17.16 ***	11.72 ***	4.88 ***
Parity No.	3	7.03 ***	0.10	0.79
Sex of feti	2	1.61	0.99	0.04
Type of feti	1	1.81	0.32	1.25
Regression on age of ewe:				
linear	1	9.11 ***	2.97	0.07
quadratic	1	6.09 ***	4.50 *	0.68
Regression on body weight of ewe:	1	0.69	0.08	0.02
Linear				
quadratic	1	1.20	0.10	0.07
Remainder: d.f	310			
Remainder: MS		764.76	613.71	0.23

** = P< 0.01 and *** = P< 0.001

were 93.49 and 90.35 mg /dI in 10th days of pregnancy and 134.79 and 141.81 mg/dI in 145th days of pregnancy for Ossimi and Rahmani, ewes respectively (table 14). The same trend was found for the plasma value of L/G ratio due to the effect of days of pregnancy. Obtained results are similar to those found by **Rizk (1999)** who stated that month of pregnancy had a significant ($p < 0.001$) effect on total lipids level and increased gradually from 1st month (266.6 mg/dl) to 5th month of pregnancy (319.2mg/dl). Also, the present results is partially in agreement with the finding of **Krajnicakova *et al.*, (1993)** who found that total lipids decreased on day of insemination then increased to fall again to a minimum value in the 3rd month of pregnancy . **Rawal *et al.*, (1987)** found higher levels of cholesterol than the levels obtained in the present study as they stated that, in Muzaffarngri sheep in the 1st ,2nd ,3rd, 4th and 5th month of pregnancy the upper limits of serum cholesterol were 198.00 , 213.30,210.00,203.08 and 232.50 mg/100ml,respectively .They added that, increasing level in serum cholesterol was observed with advancement of pregnancy period .In the contrary **Okab *et al.*,(1993)** stated that stage of pregnancy had significant effect on plasma cholesterol levels but not on plasma total lipids and values concentration of both compounds were low near parturition .

4.3.2.3 Effect of parity number of ewes :

The total lipids and cholesterol (mg/dI) increased , in general , gradually from the 1st parity (285.27 and 125.01 gm/dI, respectively) to the 4th parity (330.81 and 128 .24mg/dI, respectively). The values of plasma total lipids /cholesterol ratio increased gradually similar to both

of plasma total lipids and plasma cholesterol levels (table 13).

Analysis of Variance (Table 15) showed that effect of parity number was significant ($p < 0.001$) for total lipids levels and non significant for cholesterol and L/C ratio . The present results disagree with the findings of **Ramos *et al.*, (1994)** who found that , the cholesterol levels decreased significantly with advancing age . And agreed with that found by **Rizk (1999)** who stated that plasma lipids fraction increased gradually with increasing the parity number of ewes during pregnancy period.

4.3.2.4 Effect of sex of feti :

Table (13 and 15) show that the sex of feti effect on total lipids and cholesterol levels were non significant , Similar trend was showed in case of L/C ratio .

The plasma total lipids increased (303,309 and 312 mg/dl) in ewes having female, male and twins (male and female) respectively, similar trend was shown for cholesterol levels (122.66, 127.35 and 127.29 mg/dl, respectively). While, the values of total lipids/ cholesterol were 2.54, 2.54 and 2.58 in ewes having female, male and twins (male and female), respectively.

These results go in harmony with the finding of **Rizk (1999)** who showed non significant differences due to the effect of sex of embryo on plasma total lipids , cholesterol levels and plasma value of total lipids / cholesterol ratio in Rahmani ewes during pregnancy period.

4.3.2.5 Effect of type of feti:

The effect of type of feti on levels of total lipids , cholesterol and total lipids /cholesterol was non significant(table 15). The means of

plasma total lipids, cholesterol levels and plasma value of L/C ratio were 304.66, 127.31 mg/dl and 2.49. in ewes having twins feti compared with 312.91, 124.22 mg/dl and 2.61 in ewes having single feti (table 13). These results are in agreement with those obtained by **Rizk (1999)** who showed non significant variations due to the effect of type of feti on lipid fractions in Rahmani ewes during pregnancy period .

4.3.2.6 Regression on age and body weight of ewe:

The present results (table 15) showed that the coefficients of linear and quadratic regression equations of the levels of total lipids and cholesterol on age of ewe during pregnancy period were statistically significant ($p < 0.01$ or $p < 0.001$). These results are in agreement with those obtained by **Rizk (1999)** who found significant effect due to the regression of the levels of total lipids and cholesterol on age of ewe during pregnancy period. And also with the finding of **Ramos *at al.*, (1994)** who stated that the levels of cholesterol tended to be decreased with advancement of age of ewe.

Obtained results also, showed non significant differences due to the regression (linear and quadratic) of the levels of lipids fractions on body weight of ewes (table 15).

4.4 The hormonal pattern during post-partum period :

Plasma sexual hormones (progesterone and estradiol-17ß) as well as plasma thyroid hormones (T_3 and T_4) were estimated at the lambing day and at 30 day intervals along 60 days of the post –partum period for experimental groups of ewes.

4.4.1 : Sexual hormones (Progesterone and estradiol -17ß level):

4.4.1.1 : Effect of breed group :

Data presented in Table (16) show the means of plasma progesterone and estradiol -17ß levels as affected by the various factor studied along60 days of post-partum period in Ossimi and Rahmani ewes.

It was found that Rahmani ewes had relatively higher means of either progesterone or estradiol-17β level (1074.73 pg/dl and 2.64 ng/ml) compared with (1207.60 pg/dl and 2.50 ng/ml) than Ossimi ones . However, analysis of variance revealed no significant variation in plasma progesterone level or plasma estradiol-17β level due to ewe's breed (table 18). These results agree with the finding of **Kudari (1992) and El-Sayed and Abdel-Gaffar (1998)** who found no significant variation in plasma estradiol -17 β and also plasma progesterone levels due to breed of ewe during post- partum period.

4.4.1.2 Effect of days of post -partum :

Data presented in table (17) show the least squares means of plasma estradiol-17β and progesterone levels as affected with time of estimation along 60 days of post–partum period in Ossimi and Rahmani ewes.

It was found that Rahmani ewes had relatively higher mean values of estradiol-17 β at 30^{th} and 60^{th} days compared with Ossime ewes. While, the least squares mean of progesterone decreased in Rahmani ewes compared with Ossime ewes at the same time of estimation.

Means of progesterone in Ossimi and Rahmani ewes were 1.98 and 1.84 at 30days and 3.29 and 3.16 ng/ml at 60 days after parturition, respectively . While , the means of estradiol-17 β were 1123.5 and 1134.5 pg/ml at 30 days, similarly, 1025.9 and 1280.6 pg/dl at 60 days after

Table (16): Least squar means ± staudard error (LSM+SE) of factors affecting plasma estradiol -17β and progesterone levels during post –partum in Ossimi and Rahmani ewes.

Independent vaviable	No. of ewe	Number of estimation	LSM+SE	
			Estradiol -17ß (pg/dl)	Progesterone (ng /ml)
Breed:				
Ossimi	18	36	1074.73±167.89	2.64±0.57
Rahmani	24	48	1207.60±122.66	2.69±0.42
Parity No.:				
2nd parity	13	26	597.56 ±290.64^{b}	1.45±0.99^{b}
3rd parity	12	24	831.87±198.18^{b}	1.36±0.68^{b}
4th parity	8	16	1068.16±233.89^{ab}	3.80±0.80^{a}
5th parity	9	18	2067.06±347.15^{a}	3.67±1.19^{a}
Sex of lamb:				
Male	20	40	942.67±215.99^{b}	2.49±0.74
Female	15	30	750.31±182.85^{b}	2.38±0.63
Male and female	7	14	1730.50±270.61^{a}	2.84±0.92
Type of birth:				
Single	31	62	1263.49±166.10	2.30±0.57
Twins	11	22	1018.84±233.95	2.83±0.80
Overall mean:	42	84	1141.17±145.28	2.55±0.50

a, b, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table (17): Least square means ± standard error (LSM±SE) of estradiol- 17β and progesterone during post – partum in Ossimi and Rahmani ewes.

Days of postpartum	LSM±SE			
	Estradiol- 17β (E_2) (pg/dl)		Progesterone (P_4) (ng/ml)	
	Ossimi	Rahmani	Ossimi	Rahmani
30 day	1123.5±212.0	1134.5 ±166.1	1.98±0.72	1.84±0.57
60 day	1025.9 ±212.0	1280.6 ±166.1	3.29±0.72	3.16 ±0.57

Table (18): F-ratio of analysis of variance for factors affecting estradiol 17β and progesterone levels during post-partum in Ossimi and Rahmani ewes.

Source of variance	D.F	Means ± standard error (M+SE)	
		Estradiol -17ß (pg/dl)	Progesterone (ng /ml)
Breed	1	1.53	2.02
Days of pregnancy / breed	2	0.28	2.58
Parity No.	3	2.94*	2.14
Sex of lamb	2	3.63*	0.07
Type of birth	1	0.50	0.20
Regression on age of ewe:			
Linear	1	5.46*	0.00
Quadratic	1	10.15***	0.26
Regression on body weight of ewe:			
Linear	1	0.87	0.28
Quadratic	1	0.76	0.27
Reminder d.F	70		
Reminder MS		603180.45	7.05

Where * = P < 0.05 and *** = P < 0.001

parturition in Ossimi and Rahmani ewes, respectively. Analysis of variance revealed no significant variation in either plasma progesterone levels or plasma estradiol 17 β level due to the time intervals after parturition.

These results agree with the finding of **Kudari (1992)** who found that the plasma level of both progesterone and estradiol 17 β increased as time after parturition passed with greate rate in case of estradiol 17 β than that of progesterone. While , analysis of variance revealed no significant variation in either plasma progesterone level or plasma estradiol-17 β level due to the time intervals after parturition.

4.4.1.3 Effect of parity number :

Estradiol-17ß concentration in the blood plasma increased ($p< 0.05$) as number of ewe's parity increased (table 16) . Different trend was found in plasma progesterone level, where lowest mean was found in ewe having 3rd parities (1.36 ng/ml), while those having 4th parities showed the highest mean value (3.80 ng/ml).Ewes having 2nd and 5th parities had intermediate values of plasma progesterone level (1.45 and 3.67 ng /ml, respectively).

Obtained results go with finding of **Gamal (1986)** who found significant effect due to parity number on plasma progesterone level during postpartum period. However, the present results disagree with those of **El-Sayed (1988), Kudari (1992) and El-Sayed and Abdel – Ghaffar (1998)** who showed no significant variation in both plasma estradiol -17β and progesterone due to parity number of ewes during postpartum period.

Analysis of variance revealed significant variation ($p<0.05$) in plasma estradiol -17β level, while, the plasma progesterone level showed non significant variation due to parity numbers (table 18).

4.4.1.4 Effect of sex of lamb:

Slight variation in plasma progesterone level during the post-partum period was observed due to the sex of the lamb. It ranged from 2.38 ng/ml in ewes lambed female lambs to 2.84 ng/ml in ewes lambed twins of male and female lambs. However , the variation in plasma estradiol 17β level was relatively high as it ranged from 750.31 pg/dl in ewes lambed female to 1730.50 pg/dl in ewes lambed twins of male and female lamb. Analysis of variance showed no significant variation in the plasma level progesterone due to sex of lambs. However , analysis of variance showed significant ($p < 0.05$) variations in plasma level estradiol -17β levels due to sex of lambs. These results disagree with those found by **El Sayed (1988) and Kudari (1992)** who showed non significant effect due to sex of lamb on plasma estradiol -17β during post-partum period .

4.4.1.5 Effect of type of birth:

Ewes lambed twins had higher value of progesterone (2.83 ng /dl) level in blood plasma when compared with those having a single birth (2.30 ng /dl) .While , the means of plasma estradiol -17β were 1018.84 pg /dl and 1263.49 pg /dl in ewes lambed twins and single births, respectively, (table 16).

Analysis of variance revealed no significant variation in either plasma progesterone and estradiol-17 β due to type of birth (table 18).

These results agree with the finding of **El-Sayed (1988)** who showed non significant variation due to type of birth on plasma estradiol-17 β level during this period.

4.4.1.6. Regression on age and body weight of ewe:

The present results (table 18) showed that the coefficients of linear and quadratic regression of the levels of estradiol-17β on age of ewe during postpartum period were statistically significant ($p<0.01$ and $p<0.001$, respectively). These results are in contrary with the finding of **El-Sayed (1988) and Kudari (1992)** who found non significant variation due to age of ewe on plasma estradiol - 17 β level during postpartum period. However, the present results showed non significant effect in case of progesterone level due to the same factor **(Kudari, 1992).**

Obtained results showed non significant differences due to the regression (Linear and quadratic) of levels of both of progesterone and estradiol-17 β on body weight of ewe during this period (the same results found by **El-Sayed, 1988 and Kudari, 1992**).

However, in spite of these statistical results, the physiological indication of the obtained results could not be neglected. Various trend of changes may be considered of an important physiological value . Results obtained showed an obvious slight differences between the progesterone means of Ossimi and Rahmani ewes, various parities, different sexes of the lamb and the time interval after lambing. The insignificant value of these variation due to various studied factors may be atributed for a certain extend to the greater individual variation in the level of both hormone in blood plasma. The high standard error calculated for each means may support this suggestion. So, it is of great importance in this

aspect to suggest further study on relatively larger scale to verify this hypothesis.

4.4.2: Plasma thyroid hormones level :

Data listed in Table (19 and 21) show means of both T_3 and T_4 in plasma for either Ossimi and Rahmani ewes differing in parity number of ewe, sex of lamb and type of birth.

4.4.2.1.: Effect of breed:

Obtained result revealed that Rahmani ewes had slightly higher means of both hormones than the Ossimi ones. Variation in plasma T_3 and T_4 due to the ewe's breed was of nonsignificant values. This mostly agreed with result of thyroid hormones level during pregnancy. These results are in agreement with those reported by **Kudari (1992)** who found that, the crossbred ewes had slightly higher means of both hormones (T_3 and T_4) than the Ossimi ones. Variation in plasma T_3 and T_4 did not show any significant effect due to breed of ewes during post-partum period. In this respect, **Wallace *et al.*, (1978)** found that New South Wales Tasmania lactating ewes had significantly lower plasma thyroxine values than Queensland and Western Australia ones .

4.4.2.2. Effect of days of postpartum:

Data listed in Table (20) show the plasma means value of both T_3 and T4 for either Ossimi or Rahmani ewes differing in the periods two months after parturition .

The means value of T_3 were 78.14 and 89.45 ng/dl at 30 days and 83.90 and 71.33 ng/dl at 60 days in Ossimi and Rahmani, respectively. While plasma T_4 level did not affected by time after parturition passed. Analysis of variance showed no significant variation in both hormones

Table (19): Least square means ± staudard error (LSM±SE) of factors affecting plasma triodothyronin and thyroxin levels during post-partum in Ossimi and Rahmani ewes.

Independent variable	No. of ewe	No. of estimation	LSM±SE	
			Triiodothyronine (ng/dl)	Thyroxin (μg/dl)
Breed:				
Ossimi	18	36	81.02±9.74	4.74±0.22
Rahmani	24	48	81.39±7.12	5.38±0.16
Parity No.:				
2nd parity	13	26	79.99±16.87	5.13±0.37[a]
3rd parity	12	24	89.19±11.50	5.52±0.26[a]
4th parity	8	16	84.36±13.57	5.19±0.30[a]
5th parity	9	18	69.28±20.15	4.38±0.45[b]
Sex of lamb:				
Male	20	40	81.21±12.54	5.31±0.28
Female	15	30	76.35±10.61	5.28±0.24
Male and female	7	14	84.56±15.71	5.58±0.35
Type of birth:				
Single	31	62	79.06±9.64	4.51±0.13
Twins	11	22	82.35±13.57	5.61±0.30
Overall mean	42	84	81.16 ± 8.43	5.06±0.19

a, b, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table:(20). Least square means ± standard error (LSM ± SE) of triiodothyronine and thyroxine during post – partum in Ossimi and Rahmani ewes.

Days of postpartum	LSM ± SE			
	Triiodothyronine (T_3) (ng/dl)		Thyroxin (T_4) (µg/dl)	
	Ossimi	Rahmani	Ossimi	Rahmani
30 day	78.14±12.30	89.45± 9.65	4.74± 0.27	5.15± 0.21
60 day	83.90± 12.30	71.33± 9.65	4.73±0.27	5.61±0.21

Table: (21) F-ratio of analysis for factors affecting plasma triiodothyronine and thyroxin levels experimental ewes during post-partum in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio	
		Triiodothyronin (T_3) (ng / dl)	Thyroxin (T_4) (µg / dl)
Breed	1	0.00	4.77
Days of postpartum / breed	2	1.04	1.28
Parity No.	3	0.28	1.64
Sex of lambs	2	0.13	1.08
Type of birth	1	0.03	6.14**
Regression on age of ewe:			
linear	1	0.90	0.10
quadratic	1	1.06	0.03
Regression on Body weight:			
linear	1	1.86	6.29**
quadratic	1	1.73	5.87**
Remainder: d.f	70		
Remainder:MS		2032.25	1.01

Where ** = $p<0.01$ and

due to time intervals (table 21). This results may be due to the change in thyroid activity according to the increasing of the body weight of ewes.

These results agree with the finding of **Kudari (1992)** who found the same trend for both the two thyroid hormone (T_3 and T_4) during 60 days of postpartum period but he showed significant variation ($p<0.01$) in plasma T_3 level only due to time intervals. **Symonds *et al.*, (1990)** reported that , there were no differences in the plasma concentration of thyroxine between shorn and unshorn ewes during the first 30 days of lactation.

4.4.2.3. Effect of parity number:

It was found that the plasma level of both T_3 and T_4 decreased as ewe's parity increased (table 19). However, analysis of variance did not show any significant effect of ewe's parity on either plasma T_3 or T_4 level (Table 21). These results agrees with those found by **Kudari (1992)** who showed insignificant effect of ewe's parity on either plasmaT_3 or T_4 level during postpartum period.

4.4.2.4. Effect of sex of lamb:

Ewes lambed twins of male and female showed relatively higher in plasma T_3 and T_4 level (84.56 ng/dl and 5.58 μg/dl) than those lambed either male (81.21 mg/dl and 5.31 μg/dl) or female lamb (76.35 ng/dl and 5.28 μg/dl, respectively).On the other hand ewes lambed male lamb had relatively higher level of the two thyroid hormones than those lambed female lamb. Variation in plasma T_3 and T_4 due to the sex of lamb was of insignificant value.

This may be relatively attributed to different rate of milking and suckling which needs different rate of thyroid activity to face the

increased needs of energy. **Kudari (1992)** showed the same trend significant variation ($p<0.01$) in plasmaT_3 levels only due the sex of lamb

4.4.2.5. Effect of type of birth:

It was found that ewes lambed twins showed higher plasma T_3 and T_4 (82.35 ng/dl and 5.61 µg/dl, respectively) than those of ewes lambed single (79.06 ng/dl and 4.51 µg/dl, respectively). However, analysis of variance showed significant ($p<0.01$) variation in plasma T_4 levels only due to the type of birth (table 21).

4.4.2.6. Regression on age and body weight of ewe:

Obtained date showed no significant linear and quadratic variation due to ewe's age on T_3 or T_4 levels. Also, analysis of variance revealed non significant linear and quadratic variation in plasma T_3, while, significant linear and quadratic variation was obtained ($p<0.01$) due to ewe's body weight on T_4 (Table 21). These results may be due to the change in thyroid activity according to the increasing of the body weight of ewes.

These results go in harmoney with the finding of **Kudari (1992)** who found a significant variation in both of plasma T_3 and T_4 levels due to ewe's body weight. However, he found significant ($p<0.001$) linear and quadratic variation due to ewe's age on T_3 level only, while nonsignificant effect was found due to this factor on the plasma T_4 level.

4.4.3. Concentration of some blood plasma components in ewes during the first 2 month of postpartum :

4.4.3.1 Protein fractions :

4.4.3.1.1. Effect of breed:

Data presented in (Table 22) show that the differences

between means of total protein, albumin, globulin and A/G ratio due to Ossimi and Rahmani ewes were non significant. The means levels of total protein, albumin, globulin and A/G ratio were 6.96 , 3.76 , 3.20 gm/dl and 1.43 in Rahmani ewes compared with 7.05,3.63,3.41 gm/dl and 1.21 in Ossimi ewes.

These results agree with those found by **Rizk (1999)** who reported higher values of protein fractions in Rahmani ewes during post partum periods (7.11, 4.13, 2.95 gm/dl and 1.75 for, total proteim, albumin, globulin and A/G ratio, respectively). **Shetaewi and Daghash (1993)** found that, differences between mean levels of protein fractions of lactated Egyptian coarse wool ewes were non- significant. While, **Samak *et al.*, (1986)** with Barki and Rahmani ewes found that, there were significant difference between albumin concentration values due to breed effect.

4.4.3.1.2. Effect of days of postpartum:

Data presented in Table (23) show means of plasma TP , A, G and A/G ratio due to month of postpartum period.

Means value of TP and A increased at 60^{th} days after lambing (7.11, 6.95 , 3.95 and 3.87 mg/dl) compared with means at 30^{th} days (6.98, 6.97, 3.32 and 3.65 mg/dl), in Ossimi and Rahmani ewes, respectively. Similarly, the A/G ratio increased at 60^{th} day 1.38 and 1.50 compared with 1.03 and 1.35 at 30^{th} days after lambing, while means of plasma globulin decreased at 60^{th} days (3.17 and 3.07 mg/dl) compared with (3.66 and 3.32 mg/dl) at 30^{th} days in Ossimi and Rahmani, respectively.

Table: (22) Least square means ± standard error (L. S. M. ± S. E) for factors affecting plasma total protein, Albumin, Globulin and their ratio during post-partum in Ossimi and Rahmani ewes.

Independent variable	No. of ewe	No. of estimation	L. S. M. ± S. E			
			Total protein (TP) (gm/dl)	Albumin (A) (gm/dl)	Globulin (G) (gm/dl)	A/G ratio
Breed:						
Ossimi	18	36	7.05±0.04	3.63±0.21	3.41±0.20	1.21±0.16
Rhmani	24	48	6.96±0.03	3.76±0.15	3.20±0.15	1.43±0.12
Parity:						
2 nd parity	13	26	7.03±0.07[a]	3.61±0.36	3.43±0.35	1.34±0.27
3 rd parity	12	24	7.04±0.05[a]	3.46±0.24	3.58±0.24	1.04 ±0.19
4 th parity	8	16	7.10±0.06[a]	3.68±0.29	3.41±0.28	1.16±0.22
5 th parity	9	18	6.84±0.09[b]	4.05±0.42	2.79±0.42	1.73±0.32
Sex of lambs:						
Male	20	40	6.95±0.06[b]	4.00±0.27	2.94±0.26	1.53±0.20
Female	15	30	6.96±0.05[ab]	3.69±0.22	3.00±0.22	1.55±0.17
Male and female	7	14	7.10±0.07[a]	3.12±0.33	3.97±0.33	0.87±0.25
Type of birth:						
Single	31	62	6.99±0.04	3.43±0.20	3.56±0.20	1.14±0.20
Twins	11	22	7.02±0.06	3.96±0.29	3.05±0.28	1.49±0.28
Overall means	42	336	7.01±0.04	3.70±0.18	3.31±0.18	1.30±0.14

a, b, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table (23): Least square means + standard error (LSM ± SE) of total protein , albumin , globulin and their ratio during post-partum in Ossemi and rahmani ewes.

Days of postpartum	LSM ± SE							
	Total protein (gm/dl)		Albumin (gm/dl)		Globulin (gm/dl)		A/G ratio	
	Ossimi	Rahmani	Ossimi	Rahmani	Ossimi	Rahmani	Ossimi	Rahmani
30 days	6.98±0.06	6.97±0.04	3.32±0.26	3.65±0.20	3.66 ±0.25	3.32±0.20	1.03±0.20	1.35±0.15
60 days	7.11±0.06	6.95+0.04	3.95±0.26	3.87±0.20	3.17±0.25	3.07±0.20	1.38±0.20	1.50±0.15

Table (24): F- ratio of analysis for factors affecting plasma total protein, albumin and their ratio during post-partum in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio			
		Total protein (TP) (gm/dl)	Albumin (A) (gm/dl)	Globuin (G) (gm/dl)	A / G ratio
Breed :	1	1.36	0.12	0.46	1.10
Days of postpartum / breed	2	2.07	2.28	1.67	1.27
Parity No.:	3	2.39	0.44	0.84	1.34
Sex of lambs:	2	1.08	1.74	2.44	1.89
Type of birth:	1	0.09	1.58	1.47	1.23
Regression on age of ewe:					
linear	1	2.33	0.00	0.09	0.32
quadratic	1	2.54	0.11	0.44	0.86
Regression on body weight of ewe:					
linear	1	0.01	1.43	1.45	0.87
quadratic	1	0.01	1.42	1.51	0.89
Remainder :d.f	70				
Remainder :MS		0.04	0.91	0.88	0.53

These results disagree with those obtained by **Rizk (1999)** who found that , due to the effect of month of post partum , the 1st month show higher levels of TP and A than 2nd month while the level of G show the opposite trend compared to the level of A. However, **Shetaewi and Daghash (1993)** found the same trend with the present study, since they showed that plasma total protein elevated at end of lactation (d+55,7.69 gm/dl) by as such as 1.27 gm/dl (about 20%) compared to early lactation level (d+4, 6.42 gm/dl). Also, they found that the level of albumin decreased during lactation when compared with pregnancy (3.43 vs.3.38 gm/dl) in Egyptian coarse wool ewes. The differences among albumin levels due to lactation were not significant. These results may be explained by the finding of **Kaneko (1980) and Cheville (1983)** who stated that, catabolism of albumin provides protein precursors needed for the developing fetus and the lactation mammary gland and therefore the rate of albumin catabolism was higher during lactation than during pregnancy. **Klos, (1990)** found that, the prealbumin level was low in non-pregnant ewes and increased significantly during lambing and lactation.

4.4.3.1.3. Effect of parity number of ewe:

The effect of parity number on protein fractions was non significant (table 24). The mean values of plasma total protein level decreased (6.84 gm / dl in 5th parity compared with 7.03, 7.04 and 7.10 gm/dl in 2nd ,3rd and 4th parities. The mean value of plasma albumin level were 3.61 , 3.46 , 3.68 and 4.05 gm/dl in 2nd , 3rd , 4th and 5th parities, respectively. Similarly, the plasma globulin means were 3.43, 3.58 , 3.41 and 2.79 gm/dl and values of A/G ratio were 1.34 , 1.04 , 1.16 and 1.73 in 2nd, 3rd, 4th and 5th parity, respectively. The obtained results are in

agreement with the findings of **Shetaewi and Daghash, (1993)** Who found that, non significant differences were detected between pregnant and lactated ewes in serum total protein (TP) However , serum (TP) levels fall to as low as 6.76 g/dl during lactation and elevated at the end of lactation and found that , during lactation level albumin decreased ($P < 0.05$) when compared with pregnancy (3.43 Vs. 3.83 gm/dl). And disagree with what they found that , serum globulin concentration was 16 % higher during lactation than during pregnancy. Also, agree with the finding of **Rizk (1999)** who found that the differences between means of Tp, A, G and A/G ratio due to parity number effect were non – significant.

4.4.3.1.4. Effect of sex of lamb:

The effect of sex of lamb on plasma total protein , albumin, globulin and A/G ratio was non significant. Table (24). The mean values of plasma total protein of ewes lambed male and female (7.10 gm/dl) was more than mean values of ewes lambed male or female lamb (6.95 and 6.96 gm/dl), respectively. Similarly, the means of globulin of ewes lambed male and female (3.97 gm/dl) was more than mean of ewes lambed female (3.00 gm/dl) or male (2.94 gm/dl) while, the opposite result was obtained in plasma mean of albumin values. The present results agree with **Rizk (1999)** with Rahmani ewes who found non significant effect due to sex of birth on protein fractions of ewes during 60 day postpartum period.

4.4.3.1.5 Effect of type of birth:

Means of total protein and albumin and A/G ratio (7.02 , 3.96 gm/dl and 1.05, respectively) of ewes having twins birth were more than

corresponding means of ewe having single birth (6.99 , 3.43 gm/dl, and 1.04 respectively). The opposite results were obtained with globulin and A/G ratio (table 22).

Analysis of variance (table 24) showed insignificant effect on plasma protein fraction due to the effect of type of birth during postpartum period. These results agree with those reported by **Rizk (1999)** with Rahmani ewes who found nonsignificant effect due to effect of type of birth.

4.4.3.1.6. Regression on age and body weight of ewe:

The coefficient of linear and quadratic regression of total protein , albumin , globulin and A/G ratio on age and body weight of ewes were small in values, except the quadratic regression coefficient of total protein on age of ewe, however all coefficient were statistically non significant (Table 24). **Ibrahim *et al.*, (1993)** found that , only age was an important factors influencing total protein values in blood plasma of lambs. The same results also, found by **Rizk (1999)** with Rahmani ewes.

4.4.3.2 Lipid fractions:

4.4.3.2.1. Effect of breed:

Data presented in Tables (25 and 27) show that, breed of ewes had non significant effect on plasma total lipids, plasma cholesterol, while it had significant ($P< 0.05$) effect on total lipids /cholesterol ratio . The means levels of plasma total lipids, cholesterol and L/C ratio were (330.25, 138.99 mg/dl and 2.52, respectively) in Rahmani ewes compared with (334.51, 149.38 mg/dl and 2.27 respectively) in Ossimi ewes. Obtained result showed lower values of total lipids fractions of Rahmani ewes than that found by **Rizk (1999)** with the same breed (331.10 mg/dl,

140.47 mg/dl, 2.50 vs 310.57 mg/dl. 146.59 mg/dl and 2.25, respectively).

4.4.3.2.2. Effect of days of postpartum:

Data presented in Tables (26) show that ,the effect of month of post-partum on L,C and L/C ratio in Ossimi and Rahmani ewes.

Means of total lipids in blood plasma in ewes in the 30th days of lactation period were nearly similar in Ossimi and Rahmani (334.56 and 334.46 mg/dl) higher than mean of total lipids ewes in 60th days (334.45 and 327.04 mg/dl), respectively .

Means of cholesterol in blood blasma in ewes in the 1st month of lactation period (148.80 mg/dl) was lower than mean of cholesterol in 2nd month of lactation (149.95 mg/dl) in Ossimi , while , in Rahmani ewes , the means of C in blood plasma in the 1st month of lactation period (142.44 mg/dl) was higher than (135.55 mg/dl) at 2nd month after parturation. The L/C ratio were (2.28 and 2.48) at 1st month compared with (2.26 and 2.56) at 2nd month in Ossimi and Rahmani , respectively. These results, are in agreement with **Schmidt (1971)** who observed that total lipids declined shortly befor delivery and with the onset of lactation. These findings may be attributed to increasing demand of mammary gland for fatty acids and triglyceride synthesis. In this respect, **Shetaewi and Daghash (1993),** with Egyptian coarse wool ewes, found that after lambing the means of serum cholesterol were almost similar at d+4, +15 and +32 postpartum and increased to a higher level as weaning approached (d+55). Also, **Shetaewi and Ross (1991)** found that, serum cholesterol level was lower in ewes during lactation than during pregnancy period. **Rizk (1999)** found that the differences between means

Table (25): Least square means ± standard error (L S M ± S E) of factors affecting plasma total lipid, cholesterol and their ratio during postpartum in Ossimi and Rahmani ewes.

Independent Variable	No. of ewe	No.of estimation	L S M ± S E		
			Total lipids (L) (mg/dl)	Cholesterol (C) (mg/dl)	L /C ratio
Breed:					
Ossimi	18	36	334.51±6.14	149.38±6.43	2.27±0.12
Rahmani	24	48	330.25±4.48	138.99±4.70	2.52±0.10
Parity No.:					
2nd parity	13	26	311.19±10.62	161.91±11.14	1.93±0.21^{b}
3rd parity	12	24	344.31±31.00	141.12±7.60	2.57±0.14^{a}
4th parity	8	16	339.21±8.55	151.01±8.96	2.28±0.17^{a}
5th parity	9	18	334.82±12.69	122.71±13.30	2.81±0.25^{a}
Sex of lamb:					
Male	20	40	339.68±7.90	153.08±8.27	2.25±0.16^{b}
Female	15	30	340.22±6.68	135.39±7.01	2.64±0.13^{a}
Male and female	7	14	317.24±9.90	144.09±10.37	2.31±0.20^{ab}
Type of birth:					
Single	31	62	322.28±6.06	130.87±6.37	2.60±0.13
Twins	11	22	342.48±8.55	157.51±8.97	2.19±0.17
Overall mean	42	84	332.28±5.31	144.19±5.07	2.38±0.11

a, b, values in the same column within each factor with different suberscripts are significantly differed (P<0.05).

Table: (26). Least square means + standard error (LSM±SE) of total lipids , cholesterol and their ratio during post-partum in Ossimi and Rahmani.

Days of postpartum	LSM±SE					
	Total Lipids (mg/dl)		Cholesterol (mg/dl)		L/C ratio	
	Ossimi	Rahmani	Ossimi	Rahmani	Ossimi	Rahmani
30 days	334.56±7.75	333.46±6.07	148.80±8.13	142.44±6.37	2.28 ±0.15	2.48±0.12
60 days	334.45±7.75	327.04±6.07	149.95±8.13	135.55±6.37	2.26±0.15	2.56±0.12

Table (27): F-ratio of analysis of variance for factors affecting total lipids, cholesterol and their ratio during postpartum in Ossimi and Rahmani ewes.

Source of variance	D.F	F-ratio		
		Total lipids (L) (gm/dl)	Cholesterol (C) (gm/dl)	L/C ratio
Breed	1	1.09	5.50	20.61*
Days of postpartum / breed	2	0.31	0.33	0.15
Parity No.	3	2.42	1.86	3.15*
Sex of lamb	2	1.43	2.30	3.45*
Type of birth	1	2.57	4.07*	2.83
Regression on age of ewe:				
Linear	1	6.99 **	0.09	1.58
Quadratic	1	7.03 ***	0.00	1.23
Regression on body weight of ewe:				
Linear	1	0.01	0.10	0.07
Quadratic	1	0.00	0.13	0.11
Remainder: d.f	70			
Remainder: MS		805.60	886.01	0.31

Where * = P< 0.05 ** = P< 0.01 and *** = P< 0.001

of lipid fractions due to the effect of month of postpartum were non significant.

4.4.3.2.3. Effect of parity number of ewe:

Data presented in table (25 and 27) show that , parity number had significant effect on L/C ratio and non significant on total lipids and cholesterol levels . The mean levels of total lipids increased from 2nd to 3rd parity and decreased gradually in the 4th and 5th parities (311.19, 344.31, 339.21 and 334.82 mg/dl respectively), and the means of cholesterol fluctuated as they were 161.91, 141.12 , 151.01 and 122.71 mg/dl in 2nd, 3rd, 4th and 5th parity, respectively, and the opposite trend observed with respect to L/C ratio. **Mousa (1995)** reported that plasma total lipids increased gradually with increasing the age. Similar trend showed by **Rizk (1999)** on Rahmani ewes but with significant variation ($p<0.05$) on total lipids only due to the effect of parity number during postpartum period.

4.4.3.2.4. Effect of sex of lamb:

The effect of sex of lambs on plasma total lipids and cholesterol levels were non significant while it was significantly ($P<0.05$) on L/C ratio (Table 27) .The means values of plasma total lipids were 339.68, 340.22 and 317.24 mg/dl in ewes having male, female and twins (male and female), respectively. While, the means value of plasma cholesterol levels were 153.08, 135.39 and 144.09 mg/dl, respectively and the differences between male, female and twins (male and female) were non significant (table 25), similarly , the L/C ratio were 2.25, 2.64 and 2.31 and the differences between ewes having female and twins (male and female) were significant ($p<0.05$).

The obtained results are agrement with **Rizk (1999)** for total lipids and cholesterol, who found that the differences between means of total lipids and cholesterol were non significant due to the effect of sex of lamb. However, opposite trend was found for the value of L/C ratio during post partum period.

4.4.3.2.5. Effect of type of birth:

Table (27) show that the effect of type of birth on total lipids and L/C ratio were non significant. However the differences amoung levels of cholesterol was significant ($P< 0.05$). The higher plasma total lipids and cholesterol means were in ewes having twins (342.48 and 157.51 mg/dl respectively) compared with ewes having single birth (322.28 and 130.87 mg/dl respectively). While, the higher L/C ratio was in ewes having single (2.60) compared with those of ewes having twins birth (2.19). These results are disagree with the finding of **Rizk (1999)** who showed opposite trend for lipid fractions during postpartum period.

4.4.3.2.6. Regression on age and body weight of ewe:

Coefficients of linear and quadratic regression of total lipids on age of ewe were significant ($p<0.05$ and $p<0.01$, respectively) which explain that total lipids is expected to increase with 6.99 mg/dl per month unit added to the age of ewe in case of linear relationship and to increased 7.03 mg/dl in case of quadratic relationship. The values of coefficient of linear regression of cholesterol and L/C ratio were markedly higher than the values of quadratic regression, however the coefficients were statistically non significant. Also, the coefficient of linear and quadratic regression lipid fractions on body weight of ewe showed non significant effect during post partum period. These results go in harmony with those

found by **Rizk (1999)** with Rahmani ewes who found the same trend of the coefficient of linear and quadratic regression of lipid fractions on age of ewes during post partum period.