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Effects of Gestation Type and Parity on Uterus Involution in Saanen Does

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A B S T R A C T

Background/Aim: The aim of the study was to determine the effects of gestation type (single or twin) and parity (primiparous or pluriparous), on uterus involution period and on parameters that are related with uterus involution such as; caruncular diameter (CD), uterine horn diameter (UHD), uterine endometrial wall tickness (UEWT) ultrasonographically, and presence of vaginal discharge in Saanen does.

Material and Method: Totally 20 Saanen does were used for the study. Ten of them delivered twin offsprings (twin group), the other 10 does delivered single offspring (single group). The does were further categorized as either primiparous (n=7) or pluriparous (n=13). Ultrasonographic examinations were performed at postpartum (pp) 1st, 2nd, 4th, 7th, 10th, 13th, 19th, 25th, 28th days, except in three does ultrasonography was continued till 29th day of pp in which their uterine involution completed at 29th day pp. During ultrasonographic examinations CD, UHD, UEWT parameters always were measured on the thickest and same uterine horn continuously also presence of vaginal discharge were recorded in these days. Two-way ANOVA and chi-square tests were used for statistical analysis of data.

Results and Discussion: Gestation type and parity had no significant effect on CD, UHD and involution period except for CD on day 13, in Saanen does. However, uterine endometrial wall thickness on days 10, 13 and 19 were higher in twin delivered does than single ones (P<0.01). The percentage of does with ceased vaginal discharge was higher in twin group when compared with single group at day 7 postpartum (pp), (P<0.01) and the percentage of does with ceased vaginal discharge was higher in pluriparous group at day 7 pp (P<0.05) compared with primiparous ones. The results of the study indicate that vaginal discharge was ceased more rapidly in twin parturated and pluriparous does when compared with single parturated and primiparous does, respectively. According to these results uterine involution was detected as completed at the similar periods in twin and single delivering, and in primiparous and pluriparous Saanen does.

Keywords: Fetus, Multiple, Saanen Doe, Single, Uterus Involution

Gebelik Tipi ve Doğum Sayısının Saanen Keçilerinde Uterus İnvolusyonu Üzerine Etkisi

Ö Z E T

Özbilgi/Amaç: Bu çalışmanın amacı gebelik tipinin (tekiz veya ikiz) ve doğum sayısının (primiparous veya pluriparous) Saanen keçilerinde uterus involusyonu süresi üzerine ve uterus involusyonu ile ilişkili parametreler; karunkular çap (KÇ), uterus kornu çapı (UKÇ), uterus endometriyal duvar kalınlığı (UEDK) üzerine etkilerinin ultrasonografik olarak belirlenmesidir.

Materyal ve Metot: Toplam 20 Saanen keçisi çalışmada kullanıldı. Bunlardan ikiz doğuran 10 tanesi, ikiz grubunu ve tekiz doğuran diğer 10 tanesi de tekiz grubunu oluşturdu. Keçiler daha sonradan primiparous (n=7) ve pluriparous (n=13) olarak da ayrıca gruplandırıldı. Üç keçi dışındaki keçilerde ultrasonografik muayeneler doğum sonrası (ds) 1., 2., 4., 7., 10., 13., 19., 25., 28. günlerde uygulandı. Üç keçide ise ultrasonografi uterus involusyonunun tamamlandığı 29. güne kadar devam etti. Ultrasonografik muayeneler esnasında uterus kornusunun en kalın olanı üzerinde KÇ, UKÇ, UEDK ölçümleri yapıldı ve her zaman aynı kornuda ölçümlere devam edildi. Ölçüm günlerinde ayrıca vaginal akıntıda da kayıt edildi. Araştırma verisinin istatistik analizinde iki yönlü varyans analizi ve ki-kare yöntemleri uygulandı. Gebelik tipi ve doğum sayısının KÇ, UKÇ ve involusyon süreleri üzerine (13. gün KÇ hariç) Saanen keçilerinde önemli etkileri saptanmadı. Ancak, uterus endometriyal duvar kalınlığı 10., 13. ve 19. günlerde ikiz doğuran Saanen keçilerinde tekiz doğuranlarla karşılaştırıldığında yüksek bulundu (P<0.01). Vaginal akıntısı biten keçilerin yüzdesi doğum sonrası (ds) 7. günde tekiz grubu ile karşılaştırıldığında ikiz grubunda daha yüksekti (P<0.01) ve vaginal akıntısı biten keçilerin yüzdesi doğum sonrası 7. günde pluriparous grupta yüksek bulundu (P<0.05). Çalışmanın sonucu bize vaginal akıntının ikiz, pluriparous grubunda sırasıyla tekiz, primiparous grubu keçilerle karşılaştırıldığında daha hızlı kesildiğini gösterdi. Bu sonuçlara göre uterus involusyonun ikiz ve tekiz doğuran ve primiparous, pluriparous Saanen keçilerinde benzer sürelerde tamamlandığı saptandı.

Anahtar Kelimeler: Çoklu, Fötus, Saanen Keçi, Uterus İnvolüsyonu, Tekiz

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Introduction

This study may be helpful for the researchers that are planning to investigate the postpartum period and may come to fore for postpartum problems encountered at ultrasonographic diagnosis as a supporting evidence under field conditions in Saanen does. The postpartum period is very critical for a doe as it influences the subsequent reproductive performance of the animal which is characterized by the uterine involution and the return of the ovarian functions and endocrine system to a condition suitable for a new pregnancy. Delay in the morphological changes, in the reproductive tract can lead to the limitation of the reproductive performance of the animal following parturition (Ababneh and Degefa, 2005). Involution depends on many factors such as; nutrition, breed, season, dystocia, suckling (Baru et al., 1983; Degefa, 2003; Delgadillo et al., 1998; Greyling, 2000). During involution period, there must be contractions and loss of weight in the uterus as well as tissue renewal (Greyling and Van Niekerk, 1991). At the early stage of the postpartum period, uterine weight loss, reduction in size, tissue fluid loss occur more rapidly and afterwards these processes start to slow down (Baru et al., 1983; Hunter, 1980; Mwaanga and Janoski, 2000; Sanchez et al., 2002).

The aim of this study was to determine the effects of gestation type (single or twin) and parity (primiparous or pluriparous), on uterus involution period and on parameters that are related with uterus involution such as; caruncular diameter (CD), uterine horn diameter (UHD), uterine endometrial wall thickness (UEWT) ultrasonographically, and presence of vaginal discharge in Saanen does.

Materials and Methods

Study Design and Animals

This study was carried out at the Faculty of Veterinary Medicine, Istanbul Unversity with total of 21 Saanen does. The does were allocated as twin group (n=10) that delivered twin offsprings (mean age= 3,55; mean parity= 2,8 years), and 10 Saanen does that delivered a single kid (mean age= 2,9; mean parity= 2,1 years) formed the single group. The does were also further grouped according to their parities; as primiparous does (n=7; that gave birth once previously, mean age= 1,5 years) and pluriparous does (n=13, mean age= 4,1 years, gave birth several times previously). One Saanen doe aged 5 years that gave birth to 4 offsprings which was pluriparous at the same time, excluded from the study, and therefore, data of 20 Saanen does were used in the statistical analysis.

Management Conditions and Ultrasonographic Examinations

The does were kept under standard management conditions and were fed haylage and alfalfa. Ultrasonographic examinations were performed in the standing position with a linear transducer (5.0 to 8.0 mHz) using a B-mode, real-time scanner (Medison SA 600V, South Korea) adapted to a rod covered by PVC, transrectally in order to facilitate the manipulation into the animal's rectum pp at days 1, 2, 4, 7, 10, 13, 19, 25, 28 except in three does. In these three does uterine involution were completed at day 29 postpartum and one doe which did not take part in the statistical analysis uterine involution was completed in 34 day of postpartum. Day 1 was accepted as the first day following parturition. When the uterine horns and contents were detected on the equipment's monitor the transducer introduced into the rectum until the bladder was displayed on the screen and caruncular diameter (CD), uterine horn diameter (UHD), uterine endometrial wall thickness (UEWT) were all measured during ultrasonographic examinations according to single ultrasonographic measurement by the same examiner with the help of 3 or 4 assistants and were continued always on the same uterine horn, and presence of vaginal discharge were recorded in these days, too. Some of the does' uterine horns could not be properly detected on the monitor of the ultrasound device transrectally at the first two days postpartum, therefore, this problem was overcame by lifted up the animal's abdomen while animal at standing position. Ultrasonographic measurements related to CD, UEWT and UHD were completed at day 19, 25 and 29, respectively in all animals. When a caruncle appear as small echogenic area on the surface of the endometrium, the distance between two outer circumferences were measured longitudinally and recorded during sonography on the examination days. The completion of uterine involution was considered when there was no significant uterine horn diameter variation detected at two or three consecutive ultrasonographic examinations. Uterine endometrial wall thickness was measured between outer and inner circumferences of uterine wall edema when it was visualized on the screen. Uterine horn's transversal diameter measurements were taken on the largest uterine horn without discrimination of gravid or non-gravid uterine horn diameter in all animals. Vaginal discharge was detected by inspection and by using speculum on the does and recorded as present or not.

Table 1. Effects of gestation type (single or twin) and parity (primiparous or pluriparous) on caruncular diameter of ultrasonographic measurements in Saanen does.
Tablo 1. Saanen keçilerinde gebelik tipinin (tekiz veya ikiz) ve doğum sayısının (primiparous veya pluriparous) ultrasonografi ölçümlerinin karunkul çapı üzerine etkileri.

Item	n	CD1 Mean ± SE	CD2 Mean ± SE	CD4 Mean ± SE	CD7 Mean ± SE	CD10 Mean ± SE	CD13 Mean ± SE	CD19 Mean ± SE	Significance[#]
Gestation type (GT)									
Single	10	17.68[a] ±1.07	14.59[b]±1.15	12.38[c] ±1.32	10.66[d]±1.22	7.12[e] ±1.19	2.20[f]±0.80	0.00[g]±0.77	<0.001
Twin	10	21.19[a] ±1.34	17.74[b]±1.44	14.46[c]±1.65	10.83[d]±1.52	7.60[e]±1.49	5.85[e]±1.00	2.19[f]±0.96	<0.001
Parity (PAR)									
Primiparous	7	18.90[a] ±1.41	14.96[b]±1.52	12.29[c]±1.75	9.96[d]±1.61	7.17[e]±1.57	4.54[f]±1.06	0.52[g]±1.02	<0.001
Pluriparous	13	19.97[a] ±0.96	17.37[b]±1.04	14.55[c]±1.19	11.54[d]±1.10	7.55[e]±1.07	3.51[f]±0.72	1.67[g]±0.69	<0.001
P – value									
GT		0.057	0.106	0.339	0.930	0.801	0.012	0.095	
PAR		0.541	0.208	0.302	0.428	0.847	0.434	0.365	
GT x PAR		0.691	0.641	0.467	0.451	0.536	0.120	0.365	

GT x PAR: Gestation type x Parity, CD: Caruncular Diameter

[#]: Significance level according to the Repeated Measurements of ANOVA statistics

[a, b, c, d, e, f, g]: Differences between the mean values lacking a common letter in the same line are significant.

Table 2. Effects of gestation type (single or twin) and parity (primiparous or pluriparous) on uterine horn diameter evaluated by ultrasonography in Saanen does.

Tablo 2. Saanen keçilerinde gebelik tipinin (tekiz veya ikiz) ve doğum sayısının (primiparous veya pluriparous) ultrasonografi ile değerlendirilen uterus kornu çapı üzerine etkileri.

Item	n	UHD1 Mean ± SE	UHD2 Mean ± SE	UHD4 Mean ± SE	UHD7 Mean ± SE	UHD10 Mean ± SE	UHD13 Mean ± SE	UHD19 Mean ± SE	UHD25 Mean ± SE	UHD28 Mean ± SE	UHD29 Mean ± SE	Significance#
Gestation type (GT)												
Single	10	63.06^{a} ±3.10	51.10^{b} ±3.71	41.25^{cde} ±3.48	39.24^{c} ±3.30	35.04^{d} ±3.43	31.83^{e} ^{f}±2.65	27.90^{f} ±2.14	21.59^{g} ±1.63	12.04^{h} ±3.00	0^{i} ±1.15	<0.001
Twin	10	71.42^{a} ±3.87	58.98^{b} ±4.63	48.96^{c} ±4.35	43.96^{d} ±4.12	37.86^{e} ±4.29	34.19^{e} ±3.31	31.26^{ef} ±2.67	26.19^{f} ±2.03	16.88^{g} ±3.75	0.97^{h} ±1.43	<0.001
Parity (PAR)												
Primiparous	7	67.70^{a} ±4.10	51.53^{b} ±4.90	41.16^{c} ±4.60	36.75^{d} ±4.36	31.64^{e} ±4.54	29.53^{f} ±3.50	26.95^{g} ±2.83	23.83^{h} ±2.15	14.36^{i} ±3.96	0^{j} ±1,52	<0.001
Pluriparous	13	66.78^{a} ±2.79	58.55^{b} ±3.34	49.05^{cd} ±3.14	46.45^{c} ±2.97	41.26^{d} ±3.09	36.49^{e} ±2.39	32.21^{f} ±1.93	23.96^{g} ±1.47	14.56^{h} ±2.70	0.97^{i} ±1.03	<0.001
P – value												
GT		0.111	0.203	0.185	0.385	0.614	0.586	0.341	0.096	0.329	0.605	
PAR		0.855	0.254	0.175	0.085	0.099	0.120	0.144	0.960	0.968	0.605	
GT x PAR		0.116	0.177	0.766	0.605	0.367	0.276	0.290	0.749	0.767	0.605	

GT x PAR: Gestation type x Parity, UHD: Uterine Horn Diameter

#: Significance level according to the Repeated Measurements of ANOVA statistics

a, b, c, d, e, f, g, h, i: Differences between the mean values lacking a common letter in the same line are significant.

Table 3. Effects of gestation type (single or twin) and parity (primiparous or pluriparous) on uterine endometrial wall tickness evaluated by ultrasonography in Saanen does.

Tablo 3. Saanen keçilerinde gebelik tipinin (tekiz veya ikiz) ve doğum sayısının (primiparous veya pluriparous) ultrasonografi ile değerlendirilen uterus endometriyel duvar kalınlığı üzerine etkileri.

Item	n	UEWT1 Mean ± SE	UEWT2 Mean ± SE	UEWT4 Mean ± SE	UEWT7 Mean ± SE	UEWT10 Mean ± SE	UEWT13 Mean ± SE	UEWT19 Mean ± SE	UEWT25 Mean ± SE	Significance#
Gestation type (GT)										
Single	10	8.67^{a} ±0.96	6.85^{b} ±0.95	5.40^{c} ±0.89	3.88^{d} ±0.66	2.28^{e} ±0.50	0.54^{f} ±0.44	0^{f} ±0.29	0^{f} ±0.18	<0.001
Twin	10	10.82^{a} ±1.20	8.74^{b} ±1.19	6.72^{c} ±1.11	5.71^{d} ±0.82	4.67^{e} ±0.63	2.84^{f} ±0.55	1.41^{g} ±0.36	0.15^{h} ±0.22	<0.001
Parity (PAR)										
Primiparous	7	10.03^{a} ±1.27	7.95^{b} ±1.26	5.68^{c} ±1.18	4.73^{d} ±0.87	3.39^{e} ±0.66	2.09^{f} ±0.58	0.95^{g} ±0.38	0^{h} ±0.23	<0.001
Multiparous	13	9.46^{a} ±0.87	7.64^{b} ±0.86	6.44^{c} ±0.80	4.86^{d} ±0.59	3.56^{e} ±0.45	1.30^{f} ±0.39	0.46^{g} ±0.26	0.15^{g} ±0.16	<0.001
P – value										
GT		0.182	0.233	0.368	0.100	0.009	0.005	0.007	0.605	
PAR		0.720	0.840	0.599	0.906	0.836	0.277	0.298	0.605	
GT x PAR		0,485	0,133	0,245	0,228	0,071	0,065	0,298	0,605	

GT x PAR: Gestation type x Parity, UEWT: Uterine Endometrial Wall Tickness

#: Significance level according to the Repeated Measurements of ANOVA statistics

a, b, c, d, e, f, g, h : Differences between the mean values lacking a common letter in the same line are significant.

Statistical analysis

Repeated measurement of ANOVA in SPSS 10.0 statistical package (SPSS, 1999) was used to analyse data for CD, UHD and UEWT. The model included measurement time as a within-subject effect and gestation type, parity and gestation type × parity interaction as between-subject effects. Moreover, two-way ANOVA in SPSS program was applied in order to determine the effects of gestation type (single or twin) and parity (primiparous or pluriparous) on CD, UHD, UEWT and involution period for each of specific measurement time. The effects of gestation type and parity on percentage of the does completed uterine involution (%) and percentage of does with ceased vaginal discharge (%) were analysed by chi-square test. Pearson correlation method was also used to determine the relationship between time to completion of involution and ceasing of vaginal discharge. Simple regression analysis (linear, quadratic or cubic) were performed to establish prediction equation for involution curve using independent variables of CD, UHD and UEWT. The accuracy of the estimates were evaluated by r^2 and residual standard deviation, and also significance of the model.

Results

During the study no metritis or any other diseases were diagnosed in the does. The uterus was withdrawn to pelvic cavity after 2 days following parturition. Ultrasonographic measurements of caruncular diameter till 19-day postpartum of Saanen does were presented in Table 1. In this study CD could not be able to observed after 19th day of pp. According to the results of repeated measurements of ANOVA, the effect of measurement time on CD, UHD and UEWT were significant for each gestation and parity sub- groups (single, twin, primiparous, pluriparous). In general, the result indicate significant decrease between consecutive measurements for CD, UHD and UEWT. The effect of gestation type on CD at 1, 2, 4, 7, 10 and 19 days after parturition was not significant (P>0.05). However, CD at 13-d was higher in twin does compared with single ones (P<0.05). On the other hand, the effect of parity on CD was not significant in all measurements (P>0.05). Moreover, interaction of gestation type x parity has no significant influence on CD (P>0.05). The effects of gestation type and parity were evaluated by ultrasonography for UHD during 29 days after delivering were given in Table 2. Single and twin delivered does had similar UHD in all ultrasonographic measurements. Uterine horn diameter of primiparous and pluriparous does were also similar at all ultrasonographic measurements. Uterine endometrial wall thickness evaluated by ultrasonography of Saanen does during 25-d after delivering were given in Table 3. The effect of gestation type on UEWT at 1, 2, 4, 7 and 25 days after delivering was not significant (P>0.05). However, twin delivered does had higher UEWT than single ones at measurements determined at 10, 13 and 19 days

Table 4. Effects of gestation type (single or twin) and parity (primiparous or pluriparous) on involution period in Saanen does.
Tablo 4. Saanen keçilerinde gebelik tipinin (tekiz veya ikiz) ve doğum sayısının (primiparous veya pluriparous) involusyon periyodu üzerine etkileri.

Item	n	Involution Period Mean ± SE (day)
Gestation type (GT)		
Single	10	27.10±0.43
Twin	10	28.19±0.54
Parity (PAR)		
Primiparous	7	27.65±0.57
Pluriparous	13	27.64±0.39
P – value		
GT		0.132
PAR		0.986
GT x PAR		0.385

GT x PAR: Gestation type x Parity

(P<0.01). Uterine endometrial wall thickness in primiparous and pluriparous does were similar in all measurements (P>0.05). Interaction of gestation type x parity has no significant effect on UEWT (P>0.05).

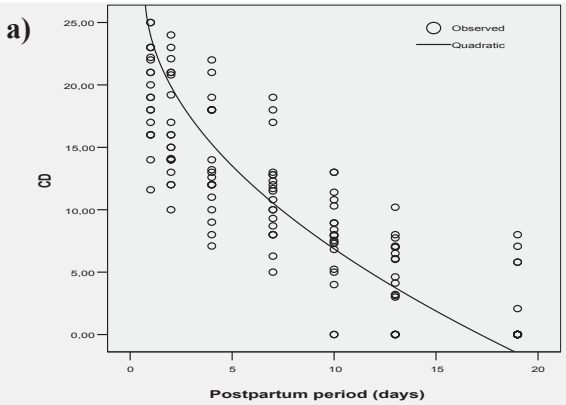
The results of regression analysis for CD, UHD and UEWT were given in Figure 1. According to the coefficient of determination and significance of models, quadratic models for CD and UHD, and cubic model for UEWT were determined as the best models. The highest r^2 value was obtained for cubic model of UEWT. The regression equation of this model was $y=22.272-6.411x+0.734 x^2$

Mean involution period in single and twin delivered does were 27.10±0.43 and 28.19±0.54 days (P>0.05), respectively (Table 4). Parity had no significant influence on involution period (P>0.05). Percentage of the does completed the uterine involution at 25th, 28th and 29th day after delivering, and ceased vaginal discharge at 4th, 7th and 10th day after delivering regarding to the gestation type and parity were presented in Table 5. Percentage of the does completed uterine involution in single- and twin-delivered groups were similar in all experiment periods (P>0.05). The effect of parity on percentage of does that had completed uterine involution was not significant (P>0.05). The difference between single- and twin-delivered does in terms of percentage of does with ceased vaginal discharge was not significant at 4th day (P>0.05). On the other hand, percentage of does with ceased vaginal discharge was higher in twin group at 7th day (P<0.01). Similar trend was observed for effect of parity (P<0.05). At 4th day, there was no significant difference between primiparous and pluriparous does, while pluriparous does had higher percentage at 7th day (P<0.05) (Table 5). On the other hand, negative and significant Pearson correlation (r=-0.574; P=0.008) between time to completion of involution and vaginal discharge was determined.

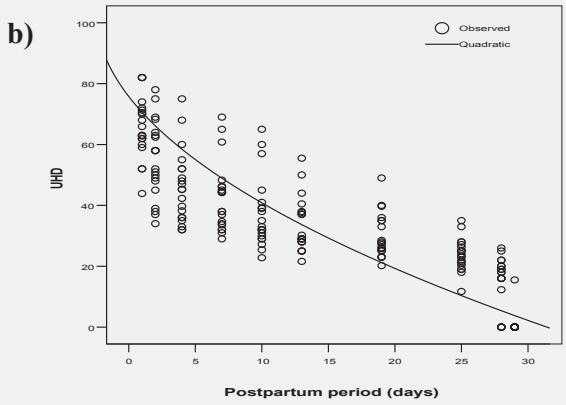
Discussion

There are very few reports available about postpartum uterine involution in small ruminants and most of them were about the uterine involution' observations after slaughtering of the animals (Degefa et al., 2006; Greyling and Van Niekerk 1991; Krajnicakova et al., 1999). Krajnicakova et al., (1999) detected relatively sizeable caruncles on the endometrium on day 17 postpartum and, the caruncles were nearly disappeared on 25th day in their study due to their examinations on slaughtered sheep and at the obtained tissues microscopically, also Greyling and Van Niekerk., (1991) reported macroscopic uterine involution in Boer does during postpartum period and they found that the caruncles of the pluriparous does were disappeared at 26.3 days when investigated on the uterus after slaughtering the animal. In this study CD could not be able to observed after 19th day of pp. These differences among the studies may arise from both the different techniques used in determining mentioned parameters and the species or breeds used in these studies.

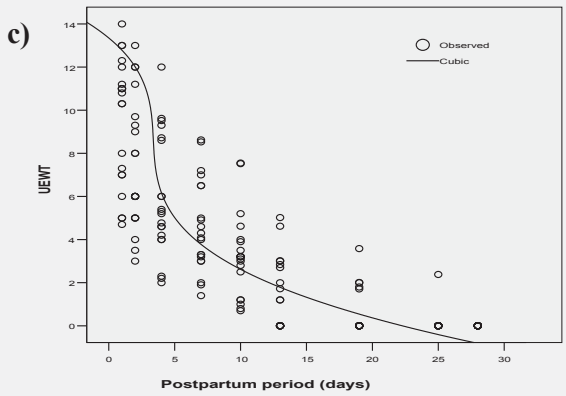
The effect of gestation type and parity on CD at 1, 2, 4, 7, 10 and 19 days after delivering were not significant (P> 0.05). However, CD at 13-d was higher in twin does compared with single ones (P<0.05). This result has no important influence on the involution period of the does as only one of the CD result was found significant. Degefa et al., (2006) reported the regression of caruncles observed apparently by day 13 pp, and complete regression of the caruncles was continued till day 19 pp. In this study regression of caruncles were completed as late as day 19 pp in twin and pluriparous does when compared with single or primiparous does which overlaps with their results. At the first 2 days of pp some of the animal's gravid uterine horns can not be properly detected on the monitor of the ultrasound device transrectally (Ababneh and Degefa, 2005), this problem was overcame by lifted up the animal's abdomen while animals were at the standing position. So, maybe transabdominal sonography can be more suitable for to detect uterine horns for uterine involution during first week after parturition as Ababneh and Degefa., (2005) suggested in their study. Ababneh and Degefa., (2005) reported greater mean uterine horns' diameter for pluriparous than primiparous in Balady does and the involution of uterus rate during the first week has been recorded faster in Balady does, this fast reduction rate decreased later. In this study; parity did not influence on the uterine horn diameter in Saanen does. This difference may be attributed to the effect of breed. The effect of parity on uterine endometrial wall thickness was not significant at 1, 2, 4, 7 and 25 days postpartum ultrasonographically and pluriparous does had higher values on days 10, 13 and 19 compared with primiparous does. Ababneh and Degefa., (2005) reported the gradual decrease of outer circumference



$y= 17.137-1.192x + 0.022x^2$; $r^2=0.748$; $P<0.001$



$y= 31.427-0.653x + 0.003x^2$; $r^2=0.737$; $P<0.001$



$y= 22.272-6.411x + 0.734x^2$; $r^2=0.768$; $P<0.001$

Figure 1. Regression analysis for caruncular diameter (CD) (a), uterine horn diameter (UHD) (b) and uterine endometrial wall tickness (UEWT) (c) during pastpartum period.
Şekil 1. Postpartum dönemde karunkul çapı (KÇ) (a), uterus kornu çapı (UKÇ) (b) ve uterus endometriyal duvar kalınlığı (UEDK) (c) için regresyon analizi

after first week through 13th day pp and found completed by day 19 pp. However, twin delivered does had higher UEWT than single ones at measurements determined at 10, 13 and 19 days (P<0.01) in present study. This difference may have been arisen because of the twin pregnancy's effect. Greyling and Van Niekerk., (1991) reported the involution period as 28 d macroscopically after slauhtering the animals, Sanchez et al., (2002) reported the same period as 16 pp in does, in this study mean involution period in single and twin parturated Saanen does were 27.10±0.43 and 28.19±0.54 days, respectively and

Table 5. Effects of gestation type and parity on percentage of does that were completed uterine involution at 25th, 28th and 29th day, and the percentage of does with ceased vaginal discharge at 4th, 7th and 10th day after parturition.
Tablo 5. Gebelik tipi ve doğum sayısının doğum sonrası 25., 28., ve 29. günlerde uterus involusyonunu tamamlayan ve doğum sonrası 4., 7. ve 10. günlerde vaginal akıntısı biten keçilerin yüzdesi üzerine etkileri.

	Percentage of the does completed uterine involution (%)			Percentage of does with ceased vaginal discharge (%)		
Item	25th day	28th day	29th day	4th day	7th day	10th day
Gestation type (GT)						
Single	30	100	100	0	20	100
Twin	10	70	100	10	80	100
P- Value	0,264	0,060	-	0,305	0,007	-
Parity (PAR)						
Primiparous	28,6	85,7	100	0	14,3	100
Pluriparous	15,4	84,6	100	7,7	69,2	100
P - Value	0,482	0,948	-	0,452	0,019	-

were not statistically significant (P>0.05); on the other hand it was recorded as 27.65±0.57 days and 27.64±0.39 days in primiparous and in pluriparous does, respectively. In twin pregnancies the slight delay in the uterine involution period may be attributed to the fetal load. There are some reports about the completion of involution period pp in does; Baru et al., (1983) reported the completion of the involution as 19 d pp, Takayama et al., (2010) compared the uterine involution between nursing (19.3 ±3.6 days) and non-nursing (18.3±4.2) Shiba does and no significant difference has been detected at the duration in the completion of the uterine involution. In this study the effect of nursing on the involution period of the does had not taken into consideration. Zdunczyk et al., (2004) reported when the uterine horn diameter exceeds 2 cm in pp period of polish longwool sheep and when there were still lochia in the lumen it is accepted as a delayed uterine involution. In this study, completion of involution was considered when there was no significant uterine horn diameter variation detected at two or three consecutive ultrasonographic examinations. We could not able to reach enough available data about the effects of gestation type (single or twin) and parity (primiparous or pluriparous) ultrasonographically during literature search, according to the results in the present study the involution completed at the similar periods in all groups. The percentage of does with ceased vaginal discharge at day 7 was higher in twin group (80%) than single group (20%) (P<0.01; Table 5). This percentage at day 7 was also higher in pluriparous group (69.2%) compared with that of primiparous does (14.3%) (P<0.05). This result showed us the vaginal discharge was ceased more rapidly in twin parturated and pluriparous does when compared with single parturated and primiparous does, respectively. Tielgy et al., (1982) reported that the discharge from the vulva continued till 18th day at most of pp.

Ultrasonography is still yet an important tool to estimate the completion and investigation of uterine involution in small ruminants. In this study gestation type and parity effects on all parameters for UHD, for CD (except for CD on day 13), for UEWT (except for UEWT on 10th, 13th, and 19th days) and involution period were found insignificant. In conclusion, these results indicate us the involution can be completed at the similar periods in twin and single delivering, and primiparous and pluriparous Saanen does.

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