

REPRODUCTIVE PERFORMANCE OF DAMASCUS AND DAMASCUS X BALADI CROSSBRED DOE KIDS

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ABSTRACT

The experimental work was carried out at Sakha Animal Production Research Station, Animal Production Research Institute, throughout two successive breeding seasons, to investigate the growth and reproductive performance of Damascus and Damascus x Baladi crossbred doe kids. A total of 45 weaned doe kids were available for this study; 18 Damascus (D), 9 (3/4D, 1/4B) and 18 (1/4D, 3/4B) weighing 13.22, 11.01 and 11.23 kg, respectively. All doe kids were born in March and April and were kept under the same management and feeding conditions over the whole experimental period. Animals were weighed monthly until 18 months of age and at occurrence of the 1st oestrus.

Starting, from four months of age (July and August) doe kids were observed daily for estrous activity and blood samples were taken twice weekly until incidence of the 1st oestrus. The experimental animals were allowed for mating at the onset of 1st estrus. Laparoscopic examination was conducted on 5 doe kids in each group 7-12 days after incidence of the 1st estrus and number of CL presented on right and left ovaries were counted.

At all ages, Damascus kids showed significantly ($P < 0.05$) higher body weights than in the 3/4D and 1/4D groups. Percentage of animals attained puberty at 1st breeding season was 33% of the total number of D doe kids and 56% of that in each of 3/4D and 1/4D groups. The rest of the animals of each group delayed to the following season. Damascus doe kids came in estrus considerably later, older and heavier than those of the two crossbred groups. The 1st estrus has been preceded by one or more progesterone spike(s) and (in most cases) ovulation. Ovulation rate was 1.0, 1.75 and 1.88 in D, 3/4D, 1/4D doe kids, respectively.

With no marked breed group differences, animals bred in the 1st breeding season had markedly low conception rates, high incidence of abortion and still birth cases and low rates of fertility. Better conception rates were obtained on second breeding season at which animal attained sexual maturity.

Keywords: Doe kids, Damascus, crossbred, reproduction.

INTRODUCTION

Puberty of the female goat of most breeds is influenced mainly by body weight and photoperiodic stimulation. Age at 1st oestrous of many goat breeds was reported to be at 5-10 months of age (Riera, 1982; Greyling and Van Niekerk, 1990 and Waldron *et al.*, 1999). The attainment of body size is important for puberty (Foster, 1980 and Foster *et al.*, 1985). Puberty is known to be a function of body weight. Age of puberty is partly dependent on the season of birth (Dyrmundsson, 1973).

Damascus goats are considered to be an important goat breed in Egypt and all Arabian countries due to their high milk yield and meat production potential. In Syria, Cyprus and Egypt, Damascus goats are seasonally bred. The length of their oestrous is somewhat irregular. They exhibit their breeding season during summer and autumn (July-November),

but rarely demonstrate estrus during winter (December and January) (Khouri, 1996 ; Constantinou, 1981 and Teleb, 2002).

The seasonal restriction to 1st estrus, subsequently to 1st mating and kidding is probably the most frequently incurred problem in goats to increase their longevity. Damascus goat germplasm was introduced to Egypt, to be used for crossbreeding local breed (Baladi) to improve milk and meat production.

Studies on Damascus, Baladi and their crosses have been conducted in Egypt in view of seasonal variations in males (Gabr *et al.*, 1997), milk production in females (Ashmawy, 1997) and reproductive performance of young males (Gabr *et al.*, 1997).

The aim of this study was to investigate the reproductive performance of D, 3/4D and 1/4D doe kids in terms of, the onset of estrous activity, prepubertal plasma progesterone profile, ovulation rate and pregnancy performance and growth performance were also studied.

MATERIALS AND METHODS

The experimental work was carried out at Sakha Experimental Station, Animal Production Research Institute, located in the Northern part of the Nile Delta throughout two successive breeding seasons.

A total of 45 doe kids were available for this study; 18 Damascus (D), 9 (3/4D.1/4B) and 18 (1/4D.3/4B) and have live body weight 13.22, 11.01 and 11.23 kg, respectively. All doe kids were born in March and April and were kept under the same management and feeding conditions over the whole experimental period. After weaning on the same suckling system, all doe kids were fed according to NRC (1985) requirements for growing doe kids until the occurrence of puberty (onset of 1st oestrus) and mating, thereafter they were fed on the basis of the physiological status of pregnancy until parturition.

Throughout the experimental period, the animals were weighed monthly until 18 months of age to detect the age of occurrence of age of 1st estrus.

Doe kids were observed every day for oestrous activity from four months of age (July and August) up to the onset of 1st estrous and mating. Estrus was detected using aproned intact fertile buck introduced to animal groups two times daily at 8 a.m. and 4 p.m. for 30 min at each time.

Blood samples were taken starting from 4 months of age until incidence of the 1st estrus and mating. They were collected from the jugular vein twice weekly. After 30 min of blood collection in vacutainer tubes, blood samples were centrifuged for 15 min at 2500 rpm for serum separation. Serum samples were stored at -20°C till progesterone assay. Progesterone was assayed in samples taken within two months preceding the occurrence of 1st estrus in four animals of each group. Direct radioimmunoassay (RIA) technique was conducted for determination of progesterone concentration.

Laparoscopic assay was conducted on 5 doe kids in each group 7-12 days after incidence of the 1st estrus to visualize the number of CL presented on right and left ovaries. A Laparoscope model (Walf, 18933/7 MM-made in USA, with W. German Care system) was used.

Statistical analysis:

Data were statistically analyzed using the general program of SAS (1999), while the significant group differences were tested according to Duncan (1955).

RESULTS AND DISCUSSION

Growth performance:

Means of live body weight (LBW) of doe kids in the different breed groups at birth, 4, 8, 12 and 16 months of age are presented in Table (1) and monthly changes up to 18 months of age are illustrated in Figure (1). At all ages studied, Damascus kids showed significantly ($P < 0.05$) higher body weights than those in 3/4D and 1/4D groups. On the other hand, there was no significant difference in LBW between doe kids 3/4D and 1/4D groups.

The marked superiority of Damascus kids than their crosses with Baladi in LBW and growth rate at different growing stages is on line with the results obtained by Gabr *et al.* (1997) on males. These differences are mainly attributed to genetic factors.

Table (1): Average live body weight (mean±SE) of doe kids in different breed groups at different stages of growth.

Age (Month)	Average live body weight (kg)		
	Damascus	3/4 Damascus	1/4Damascus
Birth	3.97±0.18 ^a	3.11±0.15 ^b	2.30±0.09 ^c
4	15.17±0.69 ^a	11.44±0.84 ^b	11.88±0.58 ^b
8	24.66±0.70 ^a	19.88±1.73 ^b	19.88±0.82 ^b
12	30.15±1.08 ^a	25.11±2.14 ^b	24.83±0.89 ^b
16	36.70±1.11 ^a	29.00±2.50 ^b	30.46±1.18 ^b

a and b: Means denoted within the same raw with different superscripts are significantly different ($P < 0.05$).

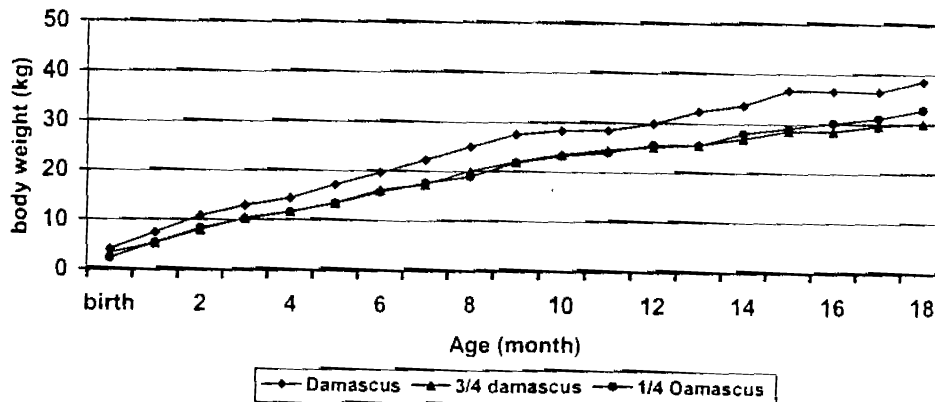


Fig. (1): Monthly changes in live body weight (kg) of doe kids in different breed groups.

Onset of estrous activity:

In all breed groups studied, some doe kids manifested estrous behaviour during the first natural breeding season following their birth, and were considered as early pubertal animals (first category). Those which have failed to show estrous during such season, delayed up to the next natural breeding season to start their estrous activity, were considered as late pubertal animals (second category).

Distribution of the number of doe kids in the different studied breed groups between the two categories and the average date, age and body weight at the onset of first estrous are presented in Table (2).

Table (2): Average date, age and body weight at the onset of first estrous (mean±SE) in doe kids of different breed groups studied.

Item	Breed group	Damascus	3/4D	1/4D
Total number		18	9	18
Early pubertal animals:				
N (%)		6(33)	5(56)	10(56)
Date (±days)		Jan., 9±9	Dec., 3±11	Nov., 10±10
Age (day)		291.0±11	269.0±9	251.0±10
Body weight (kg)		29.17±0.79	23.20±1.32	21.20±1.07
Late pubertal animals:				
N (%)		12(67)	2(22)	8(44)
Date (±days)		Oct., 30±10	Oct., 20±11	Oct., 11±12
Age (day)		591.0±10	590.0±12	582.0±12
Body weight (kg)		38.25±1.97	35.50±1.50	30.88±1.88

As shown in Table (2), the early pubertal animals represented 33% of the total number of D doe kids and 56% of that in each of 3/4D and 1/4D groups. Damascus doe kids of such category came in estrous significantly later, older and heavier than those of the two crossbred groups. On the other hand, the 1/4D crossbred animals showed the 1st estrous earlier in date, younger in age and lighter in body weight than the 3/4D ones.

In the late pubertal animals (2nd fall of their life), all traits varied in the same trend, but differences between groups were much smaller. The onset of estrous activity in such category occurred earlier in the season (October) than in the early pubertal animals (Nov.-Jan.). This is more clearly shown by the illustration of monthly distribution of animals in starting their estrous activity (Fig. 2).

It is well known that the attainment of puberty in the young female mammals is principle determined by the age-body weight complex. However, in species breeding seasonally, puberty usually occurs only during the adult breeding season, providing the attainment of the discriminating age and body weight. Thus, with sheep and goats, it is well established that puberty occurs during the first autumn of life for females born early enough and reared under good conditions. It has been proposed that the occurrence of puberty in doe kids is the commencement of a circannual rhythm of reproductive periodicity that may be entrained by photoperiodic stimulation (Amoah and Bryant, 1984).

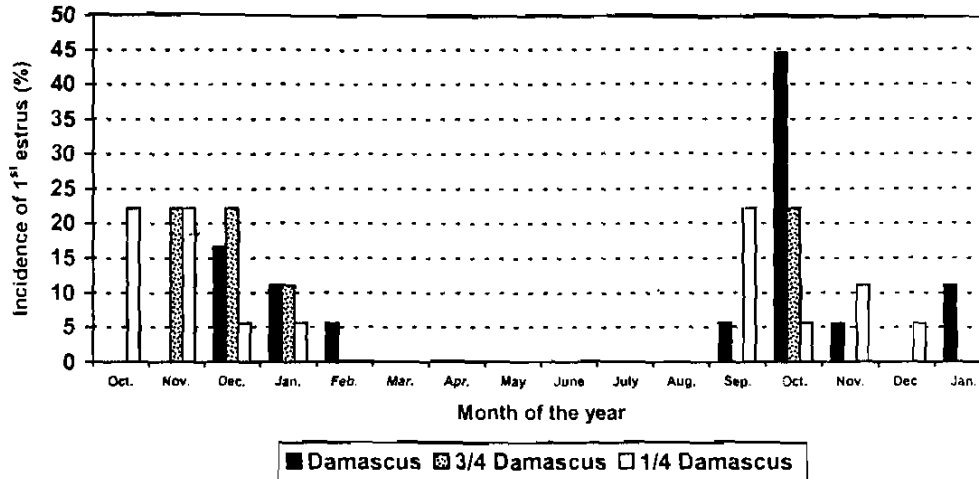


Fig. (2): Monthly distribution of the onset of oestrous activity in doe kids of different breed groups

Accordingly, in the present study, as the natural breeding season for Damascus goat breed extends from August to February (El-Shafie, 1997 and Teleb, 2002), Damascus doe kids which had suitable body weight came in estrous activity during the first breeding season of their life (early puberal animals, Table 2), while puberty in the others delayed to the next breeding season (late puberal animals).

The contemporal Damascus crossbred doe kids of the other two breed groups followed the same way as Damascus ones although they are graded from the indiginous local Baladi goats which are characterized by the ability to mate throughout the year with low seasonal variations in estrous activity (Younis *et al.*, 1988 ; Salem, 1989 and Younis *et al.*, 1989).

Breed differences in age and body weight found here are almost similar to those reported on Suffolk x Ossimi crossbreds (Aboul-Naga *et al.*, 1980) and Ossimi ewe lambs and their Finn. crosses (Sallam, 1992) in Egypt and between Spanish and Boer x Spanish doe kids in USA (Waldron *et al.*, 1999). A negative relationship between pubertal body weight and date of first estrous has been reported in sheep (Quirke, 1978) with a tendency for this relationship to be heterogenous among breeds.

It is most interesting in the present work that photoperiodic stimulation was necessary in addition to body weight threshold needed for the attainment of puberty, irrespective breed group. The early pubertal animals reached the suitable age and body weight during the first natural breeding season in their life and started to come in estrous from October, November and December in 1/4D, 3/4D and Damascus breed groups, respectively. Animals which did not exhibited estrous up to cessation of the season continued growing, but sexually quiescent, up to start of the following breeding season when they attained puberty at approximately the same time (average date in Oct., Table 2 and Fig. 2) independent of age.

Prepubertal plasma progesterone profile:

Progesterone was assayed in blood samples taken within 2 months preceding the occurrence of 1st estrus in four animals of each group.

The concentrations of progesterone in the peripheral blood serum prior to the onset of 1st estrus in the individual sampled animals of the different breed groups studied are presented in Fig. 3 (a & b). The serum progesterone profiles show that the puberal estrus was not associated with the 1st ovulation in the majority of animals. The absence of prepubertal ovulation has been only indicated in one Damascus (No. 1717) and one 3/4D.B. (No. 2248) doe kids.

One progesterone spike or more have preceded the occurrence of prepubertal ovulatory cycle(s) or onset of estrus in all animals within the 60 days before pubertal oestrus, but in no specific trend.

The occurrence of a small and brief, but significant, rise in plasma progesterone before estrous (or ovulation) is similar to that described from the period immediately before estrous in pubertal Alpine and Toggenburg goats (BonDurant *et al.*, 1981). Such rises may be important for the manifestation of the puberal estrous in concert with subsequent follicular growth and estrogen production, and the ovulatory release of LH. It has been shown that sufficient priming of P4 is necessary for sensitization of the ovary to LH discharges after inactivity in ewes (Legan *et al.*, 1985).

Previous work on Baladi (the indigenous parent of the studied crossbreds) and Damascus adult goats (El-Shafie, 1997) showed general incidence of irregular elevations in progesterone concentration and occurrence of regular pattern of progesterone concentration profile indicating silent ovulatory cycle in 33% of Baladi and 40% of Damascus does before 1st estrus of the ordinary breeding season.

Other studies with adult goats confirm that the 1st ovulation of the breeding season is usually accompanied by estrus (Thorburn and Schneider, 1972 ; Ott *et al.*, 1980 and Gaffar *et al.*, 2005). Mean plasma progesterone level in adult Damascus goats belonging to the same flock of our experimental animals during the 14 day preceding the 1st estrus of the breeding season was 0.5 ng/ml (Gaffar *et al.*, 2005). Progesterone levels during such period were basal.

Mean concentrations of progesterone at basal levels, top points and during the ovulatory cycle preceding the puberal estrous are presented in Table (3).

Table (3): Prepubertal progesterone concentrations (ng/ml) in doe kids of the different breed groups studied.

Breed group	Basal level	The prepubertal ovulatory cycle		Spikes
		Overall	The highest point	
D	0.28 (27)	4.69 (14)	16.05 (2)	3.01 (3)
3/4D	0.32 (68)	6.42 (10)	11.35 (3)	5.79 (9)
1/4D	0.28 (36)	7.39 (23)	16.62 (4)	7.18 (3)

Between brackets is the number of records.

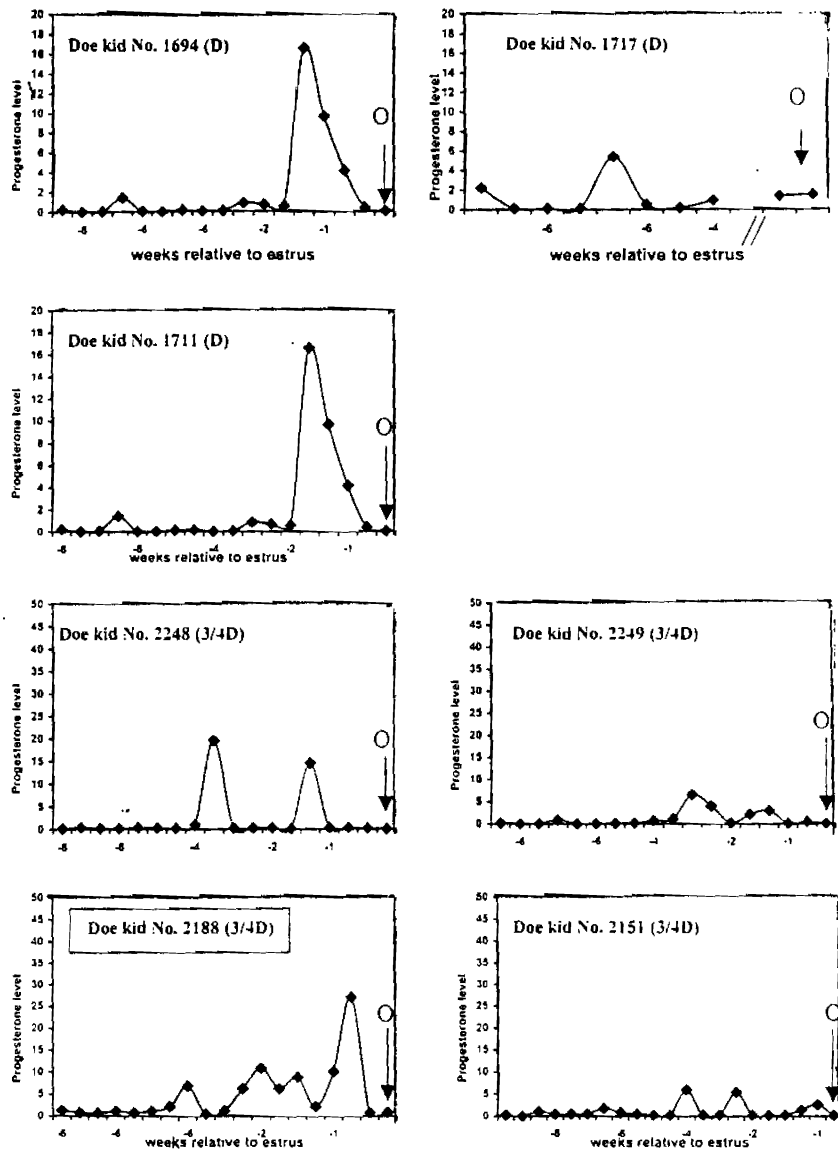


Fig. (3-a): Prepubertal progesterone concentration (ng/ml).
 ○= Ovulation estrous

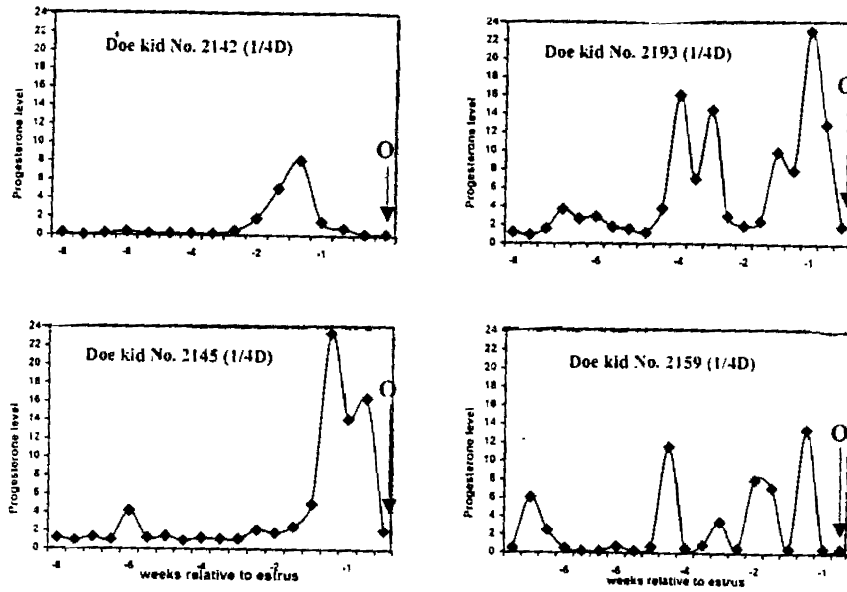


Fig. (3-b): Prepubertal progesterone concentration (ng/ml)
O=Ovulation estrous

The basal P4 levels averaged around 0.3 ng/ml, with no remarkable variations between groups. Mean level of P4 spikes and that during the prepubertal ovulatory cycle appeared considerably lower in pure Damascus doe kids than in those of the other two crossbred groups. Comparing breed groups in maximum value of P4 level relative to those of the overall means during the cycle leads to conclusion that Damascus doe kids are less regular than those of the other two breed groups in P4 concentration profile (Table 3 and Fig. 3 a&b). The ratio of the maximum /overall progesterone values were 3.4, 1.8 and 2.2 ng/ml in Damascus, 3/4D and 1/4D breed groups, respectively.

Ovulation rate:

Data in Table (4) show that average number of CL/ doe in the three breed group. D doe kids had the lowest ovulation rate (1.0) at 1st estrous compared with 1.75 in 3/4D and 1.88 in 1/4D groups.

Table (4): Ovulation rate at 1st estrous in doe kids of different breed groups.

Breed group	N	CL±SE
D	5	1.00±0.0
3/4D	4	1.75±0.48
1/4D	8	1.88±0.35

Ovulation rate: number of corpora lutea (CL) present on the two ovaries.

Litter size of mature Damascus goats had different values in different countries, being 1.69 and 1.7 in Cyprus (Constantinou, 1981 and Devendra, 1990), 1.95 in Syria (Zarkawi *et al.*, 1999) and 1.74 in El-Arish, Egypt (Shalaby *et al.*, 2000). However, in Egypt, the litter size was 1.8 for Baladi goats (El-Shafie, 1997).

Pregnancy performance:

Except for doe kids undergone laparoscopic investigation (in the 1st natural breeding season), experimental animals were allowed for mating at the onset of 1st estrus. Doe kids which failed to conceive were reallocated for mating at the following estrous during the 1st breeding season or the 2nd one.

Results of conception, kidding and fertility rates in animals mated during each season are presented in table (5). It is obviously shown in the table that the early pubertal animals, when mated at puberty, had markedly lower conception rates, higher incidence of abortion and still birth cases and consequently, more marked low rates of fertility. This could drive to the conclusion that the first breeding season of life of the spring born doe kids of either breed groups is not suitable for mating. It is worth to note that doe kids are not sexually mature at 1st estrous in their life but their reproductive system requires few months later to mature.

Table (5): Pregnancy performance of doe kids of the different breed groups mated in the 1st and 2nd breeding seasons.

Breed group	Total number ⁽¹⁾	Doe kids conceived	Conception rate (%)	Doe kids aborted	Doe kids kidded ⁽²⁾	Fertility (%)
1st breeding season:						
D	6	4	66.7	3	1	16.7
3/4D	5	2	40.0	1	1	20.0
1/4D	10	3	30.0	1	2	20.0
2nd breeding season:						
D	12	10	83.3	1	9	75.0
3/4D	2	2	100.0	0	2	100.0
1/4D	8	6	75.0	1	5	62.5
Overall:						
D	18	14	77.8	4	10	55.6
3/4D	7	4	57.1	1	3	42.9
1/4D	18	9	50.0	2	7	38.9

* Fertility = 2/1 %

The rate of abortion may be increased or lowered according to feed condition and stress that may lead to drop in maternal blood glucose level, so the fetus becomes hypoglycemic and accordingly abortion and still birth may occur (Morand-Fehr, 1981 and Bretzlaff, 1995).

In conclusion, Damascus doe kids were heavier at all different stages and at puberty, older in age and later in date of the attainment of puberty, lower on ovulation rate and less regular in pre-pubertal progesterone profile than the crossbred ones. It is recommended for doe kids of either breed groups not to be bred at onset of estrus because of their poor body condition at such time which lead to problems limiting their reproductive performance.

For both Damascus and Damascus crosses with Baladi goats the body weight threshold needed for the attainment of puberty seems to be most important emphasizing the fact that puberty is a function of body weight not age.

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الإدء التئاسلى فى الربىءاء الءمشقى وءلىط الءمشقى بلدى

بءىر السىء الصعىءى ، عمر عبء الرءمن سلاءة ، طازق عشاءوى مءموء و
مءمء ءبر ءلىل
معء بءوء الاءءاء الءىوائى ، مراء البءوء الزراعىة

أءرى هءا البءء بمءطء بءوء الاءءاء الءىوائى بسءا الاءبءة لمعء بءوء الاءءاء الءىوائى ءلال مومسى الاءسل مءالبلن. وىءءف البءء الى الاءرف على الاءء الاءسل فى الربىءاء الءمشقى وءلطانها مع البلدى. اسءءءمء ٤٥ ربىءة : ١٨ ربىءة لءمشقى ، ٩ ربىءاء ٤/٣ لءمشقى × ١/٤ بلدى ، ١٨ ربىءة ٤/١ لءمشقى × ٣/٤ بلدى وءن ١٣.٢٢ ، ١١.٠١ ، ١١.٢٣ ءءم على الاءربىء ، موالىء شهرى مارس وابرل وءء ظروف واءءة من الرعاىة والاءغنىة طوال فءرة الاءبءة، م وءن الءىوائاء ءءى ١٨ شهر وءءا عءء ظهور اول شبق. بءاءة من عمر اربع شهر (بولوى-اسءلس) مء مءابءة الشىاع يومىا وم اءء عىءاء نم مرءىن اسبوعىا لاءبءر هرمون البروءسءىرون ءءى ءءوء اول شبق. مء الاءىء الربىءاء عءء ظهور اول شبق . وم فءص الربىءاء بالمنظار الءاءلى فى الاءوم ٧-١٢ من ءءوء اول شبق لاءبء عءء الاءسام الصفرء على المببضىن الاءمن والاءسر.

فى ءمىع الاءمار اظهراء الربىءاء الءمشقى وءن ءسم اعلى من الربىءاء الءلىط . وءاءء نسبءة الربىءاء الءمشقى الءى بلءء ءنسبىا فى المومس الاءول ءوالى ٣٢% مءارءة بـ ٥٦% فى ءلا السلاالءىن الءلىط ءلال مومس الاءسل الاءول من ءىاءهن بىنما ءاء الءراء الاءر من ءل مءموءة فى مومس الاءسل الاءلى.

اظهراء الربىءاء الءمشقى شىاعا مءآءرا ولكن على وءن ءسم اعلى. ءان ءءوء الشبق الاءول بواء او اءءر مصءوبا بارءفاع بسىط فى ءركىز البروءسءىرون ومن مء ءءوء الاءببض وءسان معءل الاءببض ١ ، ١.٧٥ ، ١.٨٨ فى ءل من الربىءاء الءمشقى و ٤/٣ لءمشقى ، ٤/١ لءمشقى على الاءلى.

نسءلص من هءة الاءراء ان الربىءاء الءمشقى وءلطانها مع البلدى عءء الاءىءها على اول مومس على اول شبق بصبءها انءفاءض فى معءل الءصوبء وارئفاع ءالاء الاءءاض والفاءوق عءب الوءاءة . وىمءن ءءسبىن نسبءة الءصوبء عءء الاءىء فى مومس الاءسل الاءلى عءءما بءءمل الاءءء ءنسبى للربىءاء.