

EFFECT OF GENETIC AND PHENOTYPIC FACTORS ON KIDDING INTERVAL OF INDIGENOUS AND EXOTIC BREEDS OF GOATS AND THEIR CROSSES IN EGYPT

Abdelsalam, M.M.¹; M. Eissa² and A. I. Heider ²

¹ Animal Production Department, Faculty of Agric., Alexandria Univ.

² Animal Production Research Institute, Ministry of Agriculture.

ABSTRACT

This study was carried out on 604 records of Damascus (D), Anglo-Nubian (N), Zaraibi (Z) Baladi (B), and Angora (A) does and their first crosses with B and up grading with the improved breed, over 17 years (1985 – 2001) at the Farm of Faculty of Agriculture, Alexandria University. Kidding interval was significantly affected by genotype, age at first mating, weight of dam at previous kidding, days in milk and year of kidding. The B and Z breeds had the shortest interval among purebreds and the N had the longest interval. Kidding interval was better in the triple-bred goats (Z.ZB and A.AB) than in the half-bred (ZB and AB), while the up grading with D or N breeds resulted in increasing kidding interval. The kidding interval increased with the advance of age till the third or the fourth year of age and then decreased till six-year old with no significant effect. Does that mated for the first time at one year of age have the shortest kidding interval.

Does weighed more than 35 kg had the longest kidding interval. Does dried during the first 4-8 weeks of lactation had shorter kidding interval than those stay in milk throughout the lactation. The results recommended that does must be mated at 1 – 1.5 years of age and weighed 23-28 kgs and good management should be taken to reduce the kidding interval.

Keywords: Goats- kidding interval- genetics – phenotypics.

INTRODUCTION

Kidding interval is an important production criterion in goats; it had an effect on efficiency of production, reproduction and on genetic improvement because of faster population turnover and increased selection intensity. It is subject to partial control by management, and its economic importance is related to obtaining intervals that will maximize productivity during the life span of does. Reducing kidding interval is a contributing factor to the improvement in reproductive rate (Stewart, 2000). Breeders prefer short interval for economic profit from sale kids from continuous kidding (Saber, 2000). Variation among breeds is a reflection of seasonal reproduction activity.

MATERIALS AND METHODS

The present study was carried out on records of 604 does of 55 Damascus (D), 63 Anglo-Nubian (N), 27 Zaraibi (Z), 86 Baladi (B), 65 Angora (A) and their first crosses with B (173) and up grading with the improved breed (135), over 17 years (1985 – 2001) at the Experimental Farm of Faculty of Agriculture, Alexandria University. Animals were fed on Berseem (*Trifolium alexandrinum*) in winter and spring and chopped green maize in

summer and autumn. The flock was grazed on field crop residues and offered concentrate mixture (60% TDN and 11% DCP) plus straw. The amounts of supplements were adjusted to their maintenance and milk production requirements (NRC, 1981). They were in confinement at night. Water was offered twice daily at the early morning and again at afternoon. The animals were vaccinated against the common diseases as scheduled by the farm.

The does were mated year round, they were checked for oestrus before being exposed to fertile bucks. Kids suckled their dams from birth till weaning.

The Baladi does were divided into two groups, the first group was mated to Baladi bucks to produce replacement and the second group was mated to Damascus, Anglo-Nubian, Zaraibi and Angora bucks to produce the first crosses. These crossbreds were upgraded with the improved breed to produce the second crosses.

Kidding interval was measured for the does of different genotypes studied, as the days between the successive kidding.

Data were analyzed using least-squares analysis with unequal subclass numbers using generalized linear model procedure (SAS, 1991). The model described the kidding interval was as follows:

$$Y_{ijkLmno} = \mu + G_i + A_j + F_k + D_l + S_m + Y_n + e_{ijkLmno}$$

Where:

$Y_{ijkLmno}$ = an observation of kidding interval, on individual O,

μ = the overall mean,

G_i = the fixed effect of the i^{th} genotype of dam,

A_j = the fixed effect of the j^{th} age of doe,

F_k = the fixed effect of the k^{th} age of doe at 1st mating,

D_l = the fixed effect of the l^{th} weight of dam.

S_m = the fixed of the m^{th} days in milk.

Y_n = the fixed effect of the n^{th} year of kidding,

$e_{ijkLmno}$ = the random error assumed to be normally distributed with mean = 0 and variance = σ^2e

Differences between means were checked by Duncan(1955) New Multiple Range Test.

RESULTS AND DISCUSSION

Table (1) shows that genotype had a significant effect on kidding interval. Baladi and Zaraibi breeds had the shortest interval among purebreds followed by Angora, Damascus and then by Anglo-Nubian without significant differences between them. Kidding interval was better in the triple-bred goats (Z.ZB and A.AB) than in the half-bred (ZB and AB), while the up grading with Damascus or Anglo-Nubian breeds resulted in increasing kidding interval. This result may be due to the heavy body weight of the exotic breeds and the long lactation period. There were 33 and 40 days difference in kidding interval between DB does and both ZB and AB, while NB does had longer intervals

than ZN or AB and the differences were 15 and 20 days, respectively. Differences of kidding interval between DB, NB and either ZB or AB were 50 days. Generally, kidding interval of purebreds ranged from 348 to 360.6 days, 313 to 353 days for the half-bred and 298 to 355 days for the triple-bred goats.

Table (1). Least-squares means (\pm SE) of kidding interval (months) for genotypes, age of doe, and age at first mating.

Item	No of doe	Kidding interval
Genotype		*
Damascus (D)	55	12.2 \pm 0.76 ^a
Nubian(N)	63	12.16 \pm 0.73 ^a
Zaraibi (Z)	27	11.60 \pm 0.70 ^{ab}
Baladi(B)	86	11.60 \pm 0.79 ^{ab}
Angora (A)	65	11.96 \pm 0.56 ^a
D*B	50	11.77 \pm 0.74 ^{ab}
D*DB	30	11.85 \pm 0.42 ^a
N*B	45	11.19 \pm 0.18 ^{ab}
N*NB	33	11.77 \pm 0.59 ^a
Z*B	25	10.67 \pm 0.57 ^b
Z*ZB	20	10.04 \pm 0.49 ^{bc}
A*B	53	10.44 \pm 0.80 ^b
A*AB	52	9.94 \pm 0.55 ^c
Age of doe(year)		(NS)
2	113	10.96 \pm 0.73
3	147	11.67 \pm 0.51
4	120	11.61 \pm 0.72
5	112	11.26 \pm 1.01
6	68	10.69 \pm 0.33
7	44	10.93 \pm 0.29
Age at 1st mating(months)		**
254	254	13.27 \pm 0.74 ^a
8-11	236	9.02 \pm 0.52 ^c
12-15	114	11.61 \pm 0.51 ^b
16-20		

a, b, c Means in the same column with different superscripts significantly differ ($P < 0.05$).

NS : not significant ($P \geq 0.05$).

* significant ($P \leq 0.05$).

** significant ($P \leq 0.01$).

Kale and Tomer (1997) working on Alpine X Beetal (AB), Saanen X Beetal (SB), Alpine X SB and Saanen X AB crossbred goats, reported that kidding interval was shorter in the triple-bred goats than that in half-breeds. The present results of kidding interval were in agreement with those of Garica *et al.* (1997) on Criollo, Nubian X Criollo, Toggenburg X Criollo and Nubian X (Nubian X Criollo); Kifaro *et al.* (1997) on Norwegian dairy goats; Misra *et al.* (1998) on Pashmina goats; Singh and Mukherjee (1998) on Jamunapari

goats and Saber (2000) on Damascus, Anglo-Nubian, Angora, Zaraibi and their first cross with Baladi goats. The present results were lower than that of Gupta and Twana (1993) who suggested that kidding interval averaged 435.61 days for good milkier goats. While the present intervals were longer than the kidding interval reported by Shi *et al.* (1996); Alexandre *et al.* (1997) and Alexandre *et al.* (1999). They reported that kidding interval averaged 7 to 8.5 months.

Garcia *et al.* (1997) stated that kidding intervals of temperate purebreds or its crosses with Native, in the tropics, were within the range of 335 to 407 days. This strongly suggests that imported temperate breeds of goats in the tropics show a more marked seasonality of reproduction than the local breeds.

Age of doe failed to show any significant effect on kidding intervals, but it is worthy to note that kidding interval increased with the advance of age till the third or the fourth year of age and then decreased till six year old (Table 1). This may be due to that does had the highest milk yield and had longest lactation at their third or fourth years of age (Abdelsalam *et al.*, 1997 and Saber, 2000). Ali *et al.* (1983) stated that differences in reproduction traits by parity number were small for dairy goats, kidding interval was lower between first and second lactation compared with later kidding intervals.

Age at first kidding had highly significant effect on kidding interval. Table 1, shows that does that mated for the first time at 12 – 15 months of age had the shortest kidding interval while the younger or older does gave longer kidding interval. Iloeje and Van Vleck (1978) reported that kidding interval and age at first mating vary with breed, the correlation of age at first mating with first kidding interval was negative. This correlation indicated that selection for younger age at first mating probably would increase kidding interval. Also, Ali *et al.* (1983) reported that correlation between age at first mating and kidding interval was 0.12, which indicated that factors associated with an increased age at first kidding also are associated slightly with prolonged interval between kiddings. Rasali and Khaval (1998) reported that kidding interval was significantly affected by age of doe and the adult does gave longer kidding interval (346 days) than did the yearling does (339 days).

Weight of dam at previous kidding had highly significant effect on kidding interval (Table 2). The does weighed less than 23 kg or more than 35 kg had the longest kidding interval. This may be attributed to that exotic breeds had heavier weights so they had longer kidding interval. Garcia (1982) suggested that kidding interval was negatively correlated with body weight at the previous kidding. Saber (2000) reported that differences between different genotypes in kidding interval could be attributed to the body weight of the genotypes.

The present results in Table (2) show that kidding interval significantly increased ($P < 0.01$) as days in milk increased. The does that dried at 60 – 80 days had shorter kidding interval than did those milked till the end of lactation. Garcia (1982) and Garcia *et al.* (1997) reported that kidding interval was positively correlated with the duration of the previous lactation. Garcia *et al.* (1997) reported that does that lost their kids during the neonatal period had an average kidding interval of 180 days, but does that raised a kid

to at least one month of age had an average interval of 223 days.

Table (2): Least-squares means (\pm SE) of kidding interval (months) for weight of dam (kg), days in milk and year of kidding.

Item	No, of does	Kidding interval
Weight of dam (kg)		**
<23	152	11.45 \pm 0.79 ^b
23-28	267	9.34 \pm 0.65 ^c
29-34	106	10.21 \pm 0.30 ^{bc}
35 and more	79	14.20 \pm 0.62 ^a
Days in milk		**
60	30	7.40 \pm 0.80 ^d
90	33	8.31 \pm 0.23 ^d
120	344	10.01 \pm 0.67 ^c
150	125	14.30 \pm 0.16 ^b
180	72	16.48 \pm 1.09 ^a
Year of kidding		**
1985	32	11.22 \pm 0.51 ^{bc}
1986	50	13.35 \pm 0.59 ^a
1987	51	11.62 \pm 0.67 ^b
1988	48	12.34 \pm 0.58 ^a
1989	30	10.01 \pm 0.51 ^{cd}
1990	25	10.33 \pm 0.60 ^c
1991	34	11.94 \pm 0.58 ^{ab}
1992	39	11.77 \pm 0.67 ^b
1993	41	9.12 \pm 0.39 ^d
1994	31	10.72 \pm 0.77 ^c
1995	40	11.63 \pm 0.61 ^b
1996	29	12.51 \pm 0.57 ^a
1997	32	9.73 \pm 0.59 ^d
1998	28	10.54 \pm 0.59 ^c
1999	30	12.67 \pm 0.61 ^a
2000	36	11.51 \pm 0.50 ^b
2001	28	11.09 \pm 0.31 ^{bc}

a, b, c, d : Mean in the same column with different superscripts significantly differ ($P<0.05$).

** : significant

The present results in Table 2 showed that year of kidding had significant effect on kidding interval. The longest kidding interval was observed in 1986 (13.35 months) and the lowest interval in 1993 (9.12 months), the difference was 4.23 months. This may be reflecting the differences in environmental conditions. Similar results were found by Rasali and Khaval (1998) who stated that the year had significant effect on kidding interval and this may be explained by lactation length which reflects the weak or strong ovarian activity.

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تأثير العوامل الوراثية والبيئية على الفترة بين ولادتين فى سلالات الماعز المحلية والمستوردة وخطاتها

مجدى عبد السلام ١ - محمد عيسى ٢ - عادل حيدر ٢
١. قسم الإنتاج الحيوانى - كلية الزراعة - جامعة الإسكندرية - الشاطبي
٢. معهد بحوث الإنتاج الحيوانى - وزارة الزراعة - الدقى

أجريت هذه الدراسة على ٦٠٤ سجل ولادة للعنزات الدمشقى والانجلونوبيان والزرايبي والبلدى والأنجوراه وخطاتها خلال ١٧ سنة (١٩٨٥-٢٠٠١) والمرباة بمزرعة كلية الزراعة - جامعة الإسكندرية بغرض دراسة أثر بعض العوامل الوراثية والبيئية على الفترة بين ولادتين. وقد أوضحت النتائج أن الفترة بين ولادتين تأثرت معنويا بالتركيب الوراثى والعمر عند أول تلقيح، ووزن الأم فى الولادة السابقة، وعدد الأيام التى تحلب فيها، وسنة الولادة. وكانت الفترة بين ولادتين للعنزات البلدى والزرايبي أقصر من باقى السلالات النقي، بينما أظهرت الماعز الانجلونوبيان أطول فترة بين ولادتين. وكانت الفترة بين ولادتين أقصر للعنزات (٤/٣ زرايبي ١/٤ بلدى) و(٤/٣ انجوراه ١/٤ بلدى) عن تلك لعنزات الجيل الأول (٢/١ زرايبي ٢/١ بلدى) و(٢/١ انجوراه ٢/١ بلدى)، وازدادت الفترة بين ولادتين طولا بزيادة دم الدمشقى أو الانجلونوبيان. كما ازدادت أيضا بزيادة عمر العنزة حتى ٣-٤ سنوات، وقلت بعد ذلك بفروق غير معنوية. ولوحظ أن الإناث التى لفتت أول مرة فى عمر السنة أظهرت أقل فترة بين الولادتين. أوضحت نتائج هذه الدراسة أن العنزات التى تزن أكثر من ٣٥ كجم أعطت أطول فترة بين ولادتين، بينما العنزات التى جفت خلال ٤-٨ أسابيع الأولى من موسم الحليب كان لها أقصر فترة بين ولادتين عن تلك التى استمرت فى الحلابة طول الموسم. وأوصت النتائج أن يتم تلقيح الإناث لأول مرة فى عمر سنة إلى سنة ونصف فى وزن ٢٣-٢٨ كجم بشرط توفر الرعاية الجيدة لتقليل الفترة بين ولادتين.