

PRODUCTIVITY TRAITS OF LOCAL MOUNTAIN GOAT AND SOME FACTORS AFFECTING THEM

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ABSTRACT

The aim of the current investigation was to evaluate some reproductive aspects of local mountain goat raised in farm conditions. A total number of 498 does were mated during two successive years. Results revealed that fertility, conception, kidding, productivity and twinning rates averaged 80.72, 87.15, 84.94, 72.29 and 5.22 %, respectively. Litter size at birth and weaning were 1.05 and 0.9 respectively. Also, all above traits were significantly lower in does aged 2.5 years as compared with older does except those of litter size at birth and weaning. Effect of year of mating was found to be significant only on conception rate. Does mated in August resulted in a significant increase in the studied traits compared with that mated in September and October except those in twinning rate, litter size at birth and weaning. The regressions of litter size at birth and twinning rate on dam's body weights were significant.

Key words: fertility, prolificacy, litter size, mountain goat.

القس وآخرون

مجلة العلوم الزراعية العراقية - 2021: 52 (4): 913-917

الصفات الانتاجية للماعز المحلي الجبلي وبعض العوامل المؤثرة فيها

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مديرية زراعة عقرة	مديرية زراعة عقرة	كلية عقرة التقنية	كلية الزراعة	كلية الزراعة
المديرية العامة للزراعة/دهوك	المديرية العامة للزراعة/دهوك	جامعة دهوك التقنية	جامعة صلاح الدين	جامعة دهوك

المستخلص

يهدف هذا البحث الى تقييم بعض الصفات الانتاجية للماعز الجبلي المحلي المرباة في أحد القطعان التجارية. تم استخدام 498 معزة خلال موسمين تناسليين. أظهرت النتائج أن معدلات نسب الخصوبة، الاخصاب، الولادة، الانتاجية والتوائم قد بلغت 80.72، 87.15، 84.94، 72.29 و 5.22 % على التوالي. كما بلغ معدل عدد المواليد من البطن الواحدة عند الولادة والفظام 1.05 و 0.9 على التوالي. كانت جميع الصفات المذكورة أعلاه معنويا أقل عند الماعز بعمر 2.5 سنة مقارنة بالماعز الأكبر عمرا بإستثناء صفتي عدد المواليد من البطن الواحدة عند الولادة والفظام. تبين أن تأثير سنة التلقيح كان معنويا فقط في نسبة الاخصاب. سجل الماعز الملقح في شهر آب زيادة معنوية في جميع الصفات المدروسة مقارنة بالماعز الملقح في شهري أيلول وتشرين الأول بإستثناء نسبة التوائم و صفتي عدد المواليد من البطن الواحدة عند الولادة والفظام. كان انحدار صفتي عدد المواليد من البطن الواحدة عند الولادة ونسبة التوائم على وزن الماعز عند التلقيح معنويا.

الكلمات الدالة: الخصوبة، الاخصب، عدد المواليد من البطن الواحدة، الماعز الجبلي.

INTRODUCTION

Goats are important animals for the provision of animal protein and as a source of income to small holders in the less developed parts of the world (20). Moreover, goats have an adaptive capacity in survive and produce in harsh environmental conditions especially in dry area (19). The goats population in Iraq are estimated at 1.5 million heads (12), and are considered an important livestock and has significant functions for meat and milk production especially under the agriculture systems prevailing in the country (4). The economic value of the goat depends upon its productive and reproductive efficiency which determine the producing ability up to marketing or to breeding age (13). In goats, reproductive efficiency is always considered to be the most vital factor especially when the major emphasis is on meat production to ensure replacement, to provide surplus stock for sale or build up numbers and finally to ensure as high selection differential as possible (3). However, this important genetic resource unlike in dairy cattle and sheep, very limited work has been attempted to investigate the various performance and economic traits of this local breed (16). Therefore, this study was undertaken to investigate some reproductive aspects of mountain goats in Kurdistan region of Iraq.

MATERIALS AND METHODS

This experiment was carried out in a herd of goats (498 does and 27 bucks) at private farm, Akre district, Duhok governorate, Kurdistan region of Iraq during two breeding seasons 2016/2017 and 2017/2018. Most of the details of this experiment were described by Baper and Hermiz (8) and Hermiz and Baper (14).

Mating system

During the first mating season, a total of 175 does were synchronized in August using intra-vaginal sponges impregnated with 40 mg FGA for 14 days. After 48 hours of sponges withdrawn, the does were randomly placed in pens with the bucks at a ratio of 1:6 for 72 hours. Whereas during the second mating season in mid-September, all does (323) were detected for estrus by teaser buck and mated naturally at a ratio of 1:10-15. About 4-5 days pre-kidding, the pregnant does were separated from the herd and placed into kidding pens,

Age and weight of each doe at kidding, as well as sex, type of birth and birth weight of their kids was recorded within 24 hours post-kidding.

Feeding system

All animals were allowed to graze natured pasture for 8 hours daily during autumn and winter, whereas animals are grazed for 7 hours daily during spring and summer. Additionally, straw, barley and ground Oak acorn was provided in winter. Bucks were flushed pre-mating season for 4 weeks, and the does were flushed for 2 weeks prior to mating and extended for 2 weeks prior to kidding season and was continue post-kidding till weaning (3 months). The concentrate was offered daily at a rate of 0.5 kg, and contained 14.2% crud protein and 2772 kcal/kg energy.

Statistical analysis

The traits were analyzed as a threshold characters using method for all – or – non traits (0, 1) by the following model within the statistical program SAS (21):

$$Y_{ijkl} = \mu + A_i + R_j + P_k + b_{(xl-x)} + e_{ijkl}$$

Where:

Y_{ijkl} = The values of the studied trait

μ = Overall mean

A_i = Effect of i^{th} age of doe, $i = 2.5, 3.5, 4.5, 5.5$

R_j = Effect of j^{th} year of mating, $j = 2016-2017, 2017-2018$

P_k = Effect of k^{th} month of mating, $k = 8, 9, 10$

$b_{(xl-x)}$ = Effect of the regression on body weight of doe at mating

e_{ijkl} = Error term NID (0, σ^2e).

RESULTS AND DISCUSSION

Fertility, conception and kidding rates

In the current study, the fertility, conception and kidding rates averaged 80.72, 87.15 and 84.94%, respectively (Table 1). The fertility rate observed in this study was higher than those reported earlier in Iraqi goat raised on station conditions (67.6-78.3%) (17 and 24) or under farm conditions (77.27%) (2). However, it is lower than fertility rate (95.0%) recorded earlier by Alkass et al. (1) in Iraqi goats maintained on experimental state farm. Similarly, in semi-arid of Ethiopia, fertility rate of Adel local goats and their crosses with Saanen were 78 and 80%, respectively (18). Moreover, fertility is not often included as a

selection criterion in breeding programs as it is always subject to selection and has low heritability. However, to achieve high genetic potential for this trait, Bradford and Berger (9) suggested that systematic culling of unproductive animal may be the most important management practice to increase the number of lambs born in a flock of sheep. Although the conception rate was relatively high (87.15%), the reduction of fertility (80.72%) was due mainly to the losses caused by abortion ($\approx 7\%$). Therefore, better health control is required to avoid such losses. In the present investigation, kidding rate averaged 84.94% (Table 1). This value is lower than those reported earlier (91.23-95.0%) by Alkass et al. (1), Alkass et al. (2) and Alkass and Mayi (5). Such lower kidding rate was mainly due to lower incidence of multiple births (Table 3).

Productivity: A productivity of 72.29% (Table 1) was achieved in the present work which could be considered as a moderate. However, since productivity is a product of fertility, prolificacy and survival rate up to weaning, therefore any improvement in any trait or more traits will lead to an improvement in the herd.

Twinning rate and Prolificacy

It is known that litter size at birth is a combination of ovulation rate and embryo survival. In the present investigation, twinning rate, litter size at birth and at weaning averaged respectively 5.22%, 1.05 and 0.9 (Table 3). This value is comparable to the values (1.15-1.19) reported earlier by Alkass et al. (2) and Alkass and Mayi (5) on goat maintained on commercial herds, but it is lower than the value 1.33 reported by Juma et al. (17) for goat raised on state farm. Moreover, since litter size is greatly influenced by environmental factors particularly nutrition, it would be possible to design a program aimed to improve this trait independent of genetic improvement (23).

Factors affecting reproductive traits

Age of doe: It appears from tables (1 and 3) that does aged 2.5 years had lower rates of fertility (67.95%), conception (75.64%), kidding (67.95%), productivity (56.41%), and twinning (0.02%) and the differences were significant as compared with does aged 3.5

years and older (tables 2 and 4). While the differences in both litter size at birth and weaning due to age of doe were not significant. Such results is expected and could be attributed to many factors including lower ovulation rate, shorter and less intense estrus and fewer and less regular estrus during breeding season than mature ewes (11). Similarly, Ince and Koker (15) noted that the effect of age of doe on fertility was significant in Turkish season goats. Also, Anwar and Ahmad (7) reported that in Teddy goats of Pakistan, mean ovulation rate increased as animal advanced in age.

Year of mating: It seems from tables 2 and 4 that the effect of year of mating was not significant in all studied traits except the conception rate which is lower (83.28%) in the second year as compared to the first year (94.29%) which could be due to higher incidence of abortion in this year (Table 1).

Month of mating: Some of the studied traits including fertility, conception, kidding, and productivity rates were affected significantly ($p < 0.01$) by month of mating (Table 2) being highest in does mated on August, followed by September and the least were recorded in October (Table 1). It appears from table (4) that month of mating didn't affect twinning rate, litters size at birth and weaning significantly, however with using Duncan test, the litter size at weaning for does mated at August was significantly higher than those mated at October (Table 3). Although no studies have been conducted on the effect of season on reproductive aspects of local Iraqi goat, but it seems that there is a trend of seasonality on this breed.

Body weight of dam With regard to the effect of dam's body weight on studied traits, it seems from Tables (2 & 4) that only the regression coefficients of twinning rate and litter size at birth on dam's body weight were significant ($p < 0.01$) being 1.43 and 0.015, respectively (Table 3). Similarly, several studies have demonstrated that increasing of does body weight at mating increased twinning rate (6, 10 and 22).

CONCLUSION: From the results presented in the text, it seems that fertility is considered moderate, while litter size is low. However, since reproduction traits have low heritability

therefore enhancing level of feeding prior breeding and / or using hormonal therapy is enough to improve the reproductive traits of goats.

Table 1. Means for the effects on some reproductive traits of Kurdish Mountain Goat

Factors	No	Fertility (%)	Conception (%)	Kidding (%)	Productivity (%)
Means					
Overall mean	498	80.72	87.15	84.94	72.29
Age of doe(years):					
2.5	78	67.95 b	75.64 b	67.95 b	56.41 b
3.5	157	80.26 a	88.54 a	84.08 a	71.34 a
4.5	180	83.89 a	90.00 a	89.44 a	76.67 a
5.5	83	86.75 a	89.16 a	92.77 a	79.52 a
Year of mating:					
2016-2017	175	82.86 a	94.29 a	85.71 a	74.29 a
2017-2018	323	79.57 a	83.28 b	84.52 a	71.21 a
Month of mating:					
8	90	100.00 a	100.00 a	102.22 a	96.67 a
9	309	78.64 b	82.52 b	83.82 b	69.58 b
10	99	69.70 b	89.90 b	72.73 b	58.59 b
Regression on doe weight at mating:	498	-0.0025	-0.0043	0.007	-0.0015

Means having different letters within each factor/column differ significantly ($P<0.05$) according to Duncan test

Table 2. Mean squares and test of significance for factors affecting some reproductive traits of Kurdish Mountain Goat.

Factors	d.f.	Fertility	Conception	Kidding	Productivity
Mean squares					
Age of doe(years):	3	0.586 **	0.414 **	1.046 **	0.920 **
Year of mating:	1	0.123	1.374 **	0.016	0.108
Month of mating:	2	2.341 **	1.111 **	2.102 **	3.717 **
Regression on Doe weight at mating:	1	0.059	0.172	0.464	0.022
Residual	490	0.143	0.104	0.198	0.240

** $P<0.01$

* $P<0.05$

Table 3. Means for the effects on some productive traits of Kurdish Mountain Goat.

Factors	No	Twinning (%)	Litter size at birth	Litter size at weaning
Means				
Overall mean	402	5.22	1.05	0.90
Age of doe(years):				
2.5	53	0.02 b	1.00 a	0.83 a
3.5	126	4.76 a	1.05 a	0.89 a
4.5	151	6.62 a	1.07 a	0.91 a
5.5	72	6.94 a	1.07 a	0.92 a
Year of mating:				
2016-2017	145	3.45 a	1.03 a	0.90 a
2017-2018	257	6.23 a	1.06 a	0.89 a
Month of mating:				
8	90	2.22 a	1.02 a	0.97 a
9	243	6.58 a	1.07 a	0.88 ab
10	69	4.35 a	1.04 a	0.84 b
Regression on Doe weight at mating:	402	1.43	0.015	0.005

Means having different letters within each factor/column differ significantly ($P<0.05$) according to Duncan test

Table 4. Mean squares and test of significance for factors affecting some productive traits of Kurdish Mountain Goat.

Factors	d.f.	Twinning	Litter size at birth	Litter size at weaning
Mean squares				
Age of doe(years):	3	0.166 *	0.066	0.105
Year of mating:	1	0.072	0.072	0.001
Month of mating:	2	0.066	0.066	0.346
Regression on Doe weight at mating:	1	1.842 **	2.161 **	0.203
Residual	394	0.054	0.049	0.176

** $P<0.01$

* $P<0.05$

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