

A study of some factors affecting fertility, fecundity and twining rate in local and Cyprus goats

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Abstract

Analysis of 195 records of goats presented in ruminants research station, which belonged to General directorate of Agricultural Research in the 2013 production year. The records belonged to 59 local goats and 136 cyprus goats. The age of goats ranged between 2-8 years. The aim of study to know the effect of some factors affecting fertility, fecundity and twining rate in local and Cyprus goats. The results showed that the fertility, fecundity and the twining rate were 77.96%, 167.39% and 60.86% in local goats respectively. While the parameters were 80.14%, 194.44% and 69.72% respectively. There was no significant difference in fertility rate between different breeds. While there was a significant difference ($P<0.01$) in fecundity and in twining rate ($P<0.05$) for the Cyprus goats as compared with local goats. There was a high a significant difference ($P<0.01$) the weight of the mother at the insemination on the three traits. There was no significant effect of month of insemination on fertility rate, While there was a high significant ($P<0.05$) in twining rate at the months of insemination. There was a significant effect ($P<0.01$) of mother age on all traits understudy.

Keywords: goat, fertility, fecundity, twining rate, weight of goat, insemination month, age.

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دراسة بعض العوامل المؤثرة في الخصوبة والخصب ومعدل الولادات التوأمية في الماعز المحلي والقبرصي

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الخلاصة

تم تحليل بيانات 195 سجلاً للماعز المربي في محطة ابحاث المجترات التابعة للهيئة العامة للبحوث الزراعية لسنة الانتاجية 2013 والتي تعود الى 59 سجل للماعز المحلي، 136 سجل للماعز القبرصي تراوحت اعمار المعزات بين (2-8) سنوات، هدفت الدراسة لمعرفة تأثير بعض العوامل في نسبة الخصوبة والخصب ومعدل الولادات التوأمية للماعز المحلي والقبرصي، اظهرت النتائج ان النسبة المئوية للخصوبة والخصب ومعدل الولادات التوأمية للماعز المحلي والقبرصي كانت (77.96، 167.39، 60.86، 80.14، 194.44، 69.72%) على التوالي) ولم يوجد فرق معنوي بالنسبة لصفة الخصوبة بين المجموعتين الوراثيتين على الرغم من ان الماعز القبرصي كان متفوق حسابيا ولكن وجد فرق معنوي عالي ($P<0.01$) في صفة الخصب وفرق معنوية ($P<0.05$) في معدل الولادات التوأمية للماعز القبرصي على الماعز المحلي، ووجد تأثير معنوي عالي ($P<0.01$) لوزن الام عند السفاد على الصفات الثلاث، وتبين عدم وجود فرق معنوي في صفة الخصوبة نتيجة لتأثير شهر السفاد ولكن وجد فرق معنوي عالي ($P<0.01$) بين شهري السفاد لصفة الخصب وفرق معنوي ($P<0.05$) لمعدل الولادات التوأمية، وكان لتأثير عمر الام فرق معنوي عالي ($P<0.01$) على جميع الصفات المدروسة.

الكلمات المفتاحية: ماعز، خصوبة، خصب، معدل الولادات التوأمية، وزن المعزة، شهر السفاد، العمر.

Introduction

The goats was considered one of first animal domesticated by human being. The goats nearly distributed all over the world. Its varied in their presentation, concentration according to environmental, geographical, economical and social conditions. The numbers of goats all over the world about 1005 millions at 2013, and the huge numbers are presents in Asia and then in Africa, while the numbers of goats in Iraq about 1-6 million following the numbers of sheep and cattle (FAO, 2013). The goat charachrized by their requirement of simple food and management. In addition to their ability of twining birth, high ability of feed conversion, early sexual puberty, long productive life, performance of rearing ability, feeding on ration not consumed by other animals and their low price beside their variability in production, that is why the goats called the cow of poor man. In Iraq there are three breeds of goats, mountain Black goats, long hair goats and local Black goat (1). Cyprus breed goats were imported to Iraq at 2006 by the Ministry of Agricultural and managed in Ruminant Research station in order to distribute this type of goats. Reproductive performance considered as one of basic principle of goats management and other farm animals. The reproductive performance well desired, in addition to production of milk and hair. When the meat production is the main target, the reproductive performance became the most important traits for animal production (2). The fertility which is a percentage of the number of pregnant female to the total numbers of female inseminated with males, while, fecundity expressed as a percentage of the numbers of kids percentage doe (female) or (for 100 female) percentage year, and the mean of twining birth; the numbers of twining birth to the total numbers of female given birth, and the percentage of some important indices for reproductive performance (2). These indices affected by several factors; genetic and environmental factors. The aim of the study to know the numbers of factors (genetic groups, weight of mother, month of season and age of the mother) affecting fertility, fecundity, the mean of twining birth, and their effect on reproductive performance for local and Cyprus goats.

Materials and Methods

The study was conducted on Ruminants Research Station that belonged to General Directorate of Agricultural Research, that located on the west of Baghdad during the production year of 2013. Analysis of 195 records of goats presented in the station. The record belonged to 59 local goats and 136 Cyprus goats. The age of the goats ranged between 2 to 8 years. The animals were divided into four groups according to their weight; the animals weighed before insemination; The first group including animals that have a weight of 20-30 Kg, the second group included the animals having 30-40 kg. The third group included a weight of 40-50 kg, while the fourth group included the weight of 50-60 kg and more. The breeding season begins at the station in October (10) and ended at the end of November (11). Each herd were divided into groups, each group contained 15 Doe/ for each Buck in order the insemination have been done naturally, every inseminated Buck for each group from the same genetic group. The number of each inseminated Buck have been recorded. After the animals were getting birth. The numbers of female showed birth, and the non pregnant, types of birth (single or twin), and the total numbers of kids for each genetic group were taken. The fertility rate, fecundity and twining rate were taken according to the following equations:

$$\text{Fertility} = \frac{\text{No. of female give birth}}{\text{Total no. of female inseminated by male}} \times 100$$

$$\text{Fecundity} = \frac{\text{Total numbers of kids}}{\text{No. of female give birth}} \times 100$$

$$\text{Twining rate} = \frac{\text{No. of twining birth}}{\text{No. of female give birth}} \times 100$$

Statistical Analysis: A program of SAS-Statistical Analysis System (2012) were used to analyze the data, to study the effect of various factors on percentages of reproductive traits under the study. A comparison between percentages and significant difference using Chi-square test- X^2 .

Results and Discussion

Table (1) showed there was no significant difference between different genetic groups in the fertility rate but are thematically, the fertility in Cyprus goats was higher than in local goats

(80.14 % vs 77.96) respectively, while there was a high a significant effect ($P<0.01$) of genetic group on fecundity. There were a significant difference between Cyprus goats (194.44%) and the local goats (167.39%). Also the genetic group showed an effect on twining rate. There was a significant difference ($P<0.05$) in twining rate between Cyprus goats (69.72%) and local goats (60.86%). The results showed that the Cyprus goats are the best in certain traits as compared with the local goats. Similar observations have been made by (4) in comparison between Anglo-Nubian, Shami and local Dhofair in Oman, when the Shami showed a high twining rate (80%) as compared with other goat breed. Also it showed a fecundity of 1.8%, while the fertility nearly in the three breeds. Similar results have been found by (5) during his study on local and Shami breeds, The percentage of fertility, fecundity and twining rate is higher in Shami than in local goats. It has been observed (6) that the imported Shami goats having a higher reproductive traits (fertility, fecundity and twining rate) as compared to mature local goats. These results in agreement with other observations by several investigators (7, 8) whom showed that the Shami goats having a higher reproductive traits as compared with the local goats. It has been reported by (9). Who study the reproductive traits (fertility, fecundity and twining rate) of two breeds of goats (Baladi and Boer) in Egypt and he found that the Baladi breed has a higher fertility and fecundity as compared with Boer breed, While the Boer breed has a higher twining rate than the Baladi breed. Table (2) showed the effect of weight of the dam in the percentages of reproductive traits. It was found that there was a high significant difference ($P<0.01$) in all reproductive traits especially group 4 with a weight of 50-60Kg. This might be due to the dam with this weight might be able of provisions all the requirement for fertilization, multiple pregnancy and the parturition of healthy kids, because they have a complete anabolism of the body with large size that give them the superiority. It has been demonstrated by (10) that increase in the body weight of female at the time of insemination leads to increase infertility and fecundity in Jamnapari goats when the weight of female increase more than 50 kg. also showed that an increase infertility in Barbari goats which give a high percentage of 63.3% at a weight of 50-54 kg. (11) investigated that a decrease in body weight of about 1.04 pound leads to a decrease of fertility in a percent of 0.5%, the correlation factor between fertility% and the weight of body at insemination is a highly significant ($P<0.01$). It reaches 0.88. It has been found by (12) that there was a high significant difference ($P<0.01$) of dam weight at the time of insemination on fecundity of goat when it reaches about 2.24 in goat with a weight of 19-20kg. It has been explained by (13) in a study of four breed of sheep (Columbia, Polypay, Rambouillet, Targhee) in the U.S.A that there was a high significant difference ($P<0.01$) of weight at the time of insemination on fertility rate, also he found that the weight at the time of insemination have a positive effect on fecundity and twining rate. In a study by (14) he found a high significant effect ($P<0.01$) of weight on fecundity of Black Bengal goats in India , when the goats with a weight more than 20.5kg having a higher reproductive traits than that of lesser weight. This might be due to their ability to develop multifetuses and finally give more twins due to the expansion of their body. It has been observed (15) that there is an increase in fertility rate in Awassi ewes when there is an increase in body weight at the time of insemination. Table (3) showed no significant difference between the months of insemination (October and November) in fertility trait, while the fecundity showed high significant ($P<0.01$) effect between the months of insemination (mating), when the fecundity is higher at November (192.66%) as compared at October (171.73%). Also the results showed that the twining rate was significantly higher ($P<0.05$) in November (70.64%) than in October (58.69%) respectively. This might be due to fact that most of the mating occurred in November was in between the Cyprus goats which is characterized by high fecundity and twining rate that reflected on the effect of insemination month, while there was no significant difference in fertility rate between insemination months. It has been found by (16) in a study on Cashmere does in Australia that there was a significant difference between the mating period of February 21 and April 21 in the fertility trait while non-significant in fecundity trait. A study (17) on a local herd of Iraqi goat showed that there were a significant effect of mating season on fertility, fecundity and twining rate if the year divided into four season. It has been demonstrated (18) that there was a high significant effects of the month of the birth on fecundity trait, which might be limited on the inseminating month in Zaraibi goat in Egypt. It has been found by (19) that there was a

significant difference in fertility trait resulted from the mating (insemination) period during their study on Saanen goats in Turkish, when the mating at halter of September is more better at the beginning of the August, with no significant in fecundity trait at the same study. It has been observed by (20) that mating month have nearly significant ($P < 0.01$) on fertility trait on their study on payoya goats in Spanish, when May month is the better in fertility rate as compared with March, April and July. (21) showed no significant difference between two mating periods (rainfall and dry periods) during a year on the fertility and fecundity traits in a Dwarf sheep at West Africa. Table (4) showed a high significant difference ($P < 0.01$) in fertility, fecundity and twinning rate in a goat with 6 years of age having fertility rate of 86.36% and twinning rate of 84.21% and a goats of 5 years old with a fecundity of 216.00%. The superiority of goats at 5-6 years old in the reproductive traits might be due their bodies become completely well developed so that their food in take will be metabolized for the production and development of the fetuses. In addition the well developed body leads to an increase in body size and litter size and their ability of development a numbers of fetuses and produces more kids than goats with early age. This results were in agreement with (22) who found the higher fertility rate in the local goats were at age of 4.9 years. (8) observed a high significant effect ($P < 0.01$) of the old of the goat on fertility trait. It has been showed by (23) that there was a significant effect of the old of the goat ($P < 0.05$) on fertility, when they are study on Saanen goats in Turkish with on age of 5 years having the better traits as compared with other ages understudy. It has been observed by (24) that there was a significant effect ($P < 0.05$) of goats age on fecundity rate, where the higher ages showed the better fecundity as compared other ages. This is in accordance of (25) who showed that the age of goat had a significant effect ($P < 0.05$) on fecundity in meat producing goats in U.S.A. with an age of 5 years of high in all traits. While (26) found goats with 6 years old was superior with a high significant difference ($P < 0.01$) during their study to 5 breeds of goats in Mexico. Similar observations have been made by (17), who found a high significant of age ($P < 0.05$) on twinning rate with a goat having an age of 5 years and more during their study on local Iraqi goats. Also (27) showed that a goat with 5 years old having a higher twinning rate as compared with lower age in Turkish goats. (28) showed no significant effect of age on fecundity in a local Iraqi goats, Shami goat and their crosses. While (29) showed no significant effect of age of goats on fertility, fecundity and twinning rate during his study on a herds of long hair Turkish goats.

Table (1) Showed the effect of genetic group on percentages of reproductive performance indices

Genetic group	Total No. of dam	No. of dam give birth	Total No. of kids	No. of twin birth	Fertility%	Fecundity%	Twinning rate%
Cyprus	136	109	212	76	80.14	194.44	69.72
Local	59	46	77	28	77.96	167.39	60.86
The value of X^2					0.892 N.S	13.661**	5.027*

* Significant ($p < 0.05$). ** Significant ($p < 0.01$).

Table (2) Showed the effect of dam weight on percentages of reproductive performance indices

Dam weight	Total No. of dam	No. of dam give birth	Total No. of kids	No. of twin birth	Fertility%	Fecundity%	Twinning rate%
Group 1	13	9	12	3	69.23	133.33	33.33
Group 2	53	40	66	23	75.47	165.00	57.50
Group 3	72	58	103	38	80.55	177.58	65.51
Group 4	57	48	108	40	84.21	225.00	83.33
The value of X^2					6.228**	18.947**	11.429**

** Significant ($p < 0.01$)

Table (3) Showed the effects of insemination month on% of reproductive performance indices

Insemination month	Total No. of dam	No. of dam give birth	Total No. of kids	No. of twin birth	Fertility%	Fecundity%	Twinning rate%
October	60	46	79	27	76.66	171.73	58.69
November	135	109	210	77	80.74	192.66	70.64
The value of X^2					1.184 N.S	8.315**	4.991*

* Significant ($p < 0.05$). ** Significant ($p < 0.01$).

Table (4) Showed the effects of dam age on percentages of reproductive performance indices

Age of dam (year)	Total No. of dam	No. of dam give birth	Total No. of kids	No. of twin birth	Fertility%	Fecundity%	Twining rate%
2	55	41	66	21	74.54	160.97	51.21
3	28	24	44	17	85.71	183.33	70.83
4	25	21	35	12	84.00	166.66	57.14
5	29	25	54	18	86.20	216.00	72.00
6	22	19	39	16	86.36	205.26	84.21
8	36	25	51	20	69.44	204.00	80.00
The value of X ²					9.254**	17.362**	10.749**

** Significant (p<0.01).

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