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Effect of sex chromatin shape and axis on litter size and livability of newly born kids in shami and local does

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Abstract
Fifty does of Shami and Local goat breeds were selected from the flock reared at ruminants researches station in Agargof (25km west of Baghdad) through the year 2016 to investigate the effect of sex chromatin shape on livability of newly born kids and litter size. Results showed a significant effect (P≤ 0.01) of sex chromatin shape on litter size in Shami breed, the highest rate was found in does with drum stick shape while the least rate was in does with small club shape namely, 1.94 and 1.25 lamb/dam respectively. Livability affected significantly (P≤ 0.01) by sex chromatin shape in the Shami goat breed, the highest rate was in does with small club while the least rate was in does with drum stick shape namely, 0.87 and 0.53% respectively. Results showed a significant regression of litter size on sex chromatin axis in Shami breed. Positive and significant regression (P<0.01) of litter size on vertical and horizontal axis of nuclei and number of nuclear lobs namely, 0.153% / um, 0.182 % / um and 0.001 % / lob respectively. Significant and positive regression (P<0.05) of litter size on horizontal axis of sex chromatin (0.463% / um). Positive and significant regression (P< 0.01) of litter size on vertical and horizontal axis of nuclei and number of nuclear lobs namely, 0.090%/ um, 0.232 % / um and 0.189 % / lob respectively. Negative and significant regression (P<0.05) livability on the vertical axis of nuclei and the number of nuclear lobs namely, 0.004% / um and - 0.0005% /lob respectively.

Keywords: Sex chromatin, goat breeds, livability

1. Introduction
The goat is the most important animal of the domestic animals to man in the tropics. Goats have a variety of functions and in comparison with other ruminants display a unique ability to adapt and maintain themselves in harsh environment [1]. There are more than 300 breeds of goats around the world. More than 95% of the goat population is found in developing countries [2]. In Iraq, goat population is estimated at 1.6 million [3]. They widespread in most of Iraq as a small group with sheep flocks and endowed with adaptability harsh conditions and poor pastures. Therefore, they exhibit low production and fertility rate compared with the other species [4]. Numerous studies refer that livability rate affected by many genetically and environmental factors in goats. It was reported that kid birth weight, sex, year of birth, parity of doe and litter size effect on preweaning survival of kids [5]. Mtenga *et al*. [6]. AL-Najjar *et al* [7] reported that livability affected significantly by kidding year, parity and birth type. Sahara *et al* [8] referred that the kidding percentage and litter size are the most important parameters to investigating reproductive efficiency. It is measure of production and profit point of view in the organized and unorganized sector of goat farming. Sex chromatin (X-chromatin) is a heterochromatin mass found in the nuclei in interphase, it is called sometimes Barr body.In fact sex chromatin is X chromatin which missed the activity through the primary meiosis [6, 9]. There are many different shapes of sex chromatin in neutrophils of sheep and goat there are four shapes: drum stick, sessile nodule, tear drop and small club [10]. The sex chromatin body presented on the nucleus jutting slightly from the tip of the main nucleus, the shape of the head is round or oval with average size of 1.77 x 1.0 micron in goat [11].
Many studies have indicated that the relationship of sex chromatin shape with fertility rate, prolificacy and fertilize estrous sequences and reported that sex chromatin shape and axis can used as a genetic markers in selection of domestic animals [8, 11, 12]. The major aim of this study is to evaluate the effect of sex chromatin shape on livability and litter size in of kids in Shami and local does and consider the results as guidelines or indicators for the management strategies for goats under the farming conditions for selecting and improving the performance

of domestic animals depending on this indicators.

2. Materials and methods

2.1 Experimental Animals and management:

Fifty does of Shami and local goat breeds (25 females from each breed) were selected of the flock reared at ruminants researches station in Agargof (25km west of Baghdad). All does were in 3rd parity. Flock is housed under semi-open sheds and can be fed on the concentrated ration consuming about (500 – 600) gm/ head/ day, for the period from mating season to the last six weeks of pregnancy. Ration is normally containing 37% yellow corn**,** 40% wheat bran, 10% hulled barley**,** 5–10% soy bean meal, 1% NaCl and 1% CaCO3.and green roughages such as Alfalfa and clover can be added throughout the season. Annual routinely operations on goats are dipping and washing with chemicals in order to kill extra parasites. Sires and dams will be recorded in breed records. Kids are weighed directly after parturition and tagged with plastic tags. The health status of the flock must be under regular observations.

Blood Samples were withdrawn from all females at the same time each of 10 ml from the jugular vein from each animal. Every sample was divided in to two parts,first part was put in glass tube containing anticoagulant (EDTA) to determine the shape and dimensions of sex chromatin by using [13] method to prepare blood smear. Coles, [14] method used for staining the blood smears. Meander system used to examine the blood smear to determine the shapes of sex chromatin (drum stick, sessile nodule, tear drop and smell club) vertical and horizontal axes for sex chromatin and white blood cells nuclear which carry the sex chromatin. Litter size and livability rate were calculated for all animal groups with the same sex chromatin shape and dimensions.

2.2 Statistical analysis

Data were analyzed using SAS [15] computer program by general linear model procedure (GLM) according to the following model:

$$Yijk = \mu + Ti + b(xi - x) + eijk$$

Where:

μ: is an overall means.

Ti: Effect of sex chromatin shape

b (xi – x):Regression livability and litter size on sex chromatin axes.

eijk: is a random error.

3. Results and Discussion

Results represented in table (1) showed a significant difference (P< 0.01) among sex chromatin shapes in both Shami and Local goat breeds. In Shami breed, the highest number was the drum stick shape while the least number was the smallest club shape namely, 175 and 8 respectively. Local breed was similar toShami breed, the highest number was drum stick (171) while the least number was the small club (8). This result indicated that the chromatin shape distribution did not affected by breed and the result not agreed with the results of Okonkwo *et al.*[16] who referred to important effect of breed on sex chromatin distribution.

Table 1: Chi square test and observed numbers of sex chromatin shapes in Shami and Local goat breeds.

Breed	Sex chromatin Shape	No.	%
Shami	Drum stick	175	66.29
	sessile nodule	43	16.29
	Tear drop	38	14.39
	Small club	8	3.03
x^2 = 250.8**			
Local	Drum stick	171	75.00
	sessile nodule	37	16.23
	Tear drop	12	5.26
	Small club	8	3.51

x^2 = 312.6**

** P < 0.01

Results presented in table (2) showed a significant effect (P≤ 0.01) of sex chromatin shape on litter size in Shami breed, the highest rate was found in does with drum stick shape while the least rate was in does with small club shape namely,1.94 and 1.25 lamb/dam respectively.In local goat breed, non-significant effect of sex chromatin shape on litter size. Livability of newly born kids was also affected significantly (P≤ 0.01) by sex chromatin shape in theShami goat breed, the highest rate was found in does with small club while the least rate was in does with drum stick shape namely, 0.87 and 0.53% respectively.

Non-significant effects of sex chromatin shape on the livability of newborn kids in local goat breed.

Table 2: Effect of sex chromatin shape on litter size and livability rate in Shami and local goat breed.

Breed	Sex chromatin Shape	No.	Means ± S.E	
			Litter size (lamb / dam)	Livability(%)
Shami	Drum stick	175	0.06 a ±1.94	0.03 b±0.53
	sessile nodule	43	0.06 bc±1.37	0.06 ab ± 0.76
	Tear drop	38	0.11 ab± 1.78	0.06 ab±0.60
	Small club	8	0.16 c±1.25	0.12 a± 0.87
	Significance level		**	**
Local	Drum stick	171	1.86 ± 0.06	0.03±0.62
	sessile nodule	37	0.12±1.70	0.07±0.79
	Tear drop	12	0.25±1.66	0.14±0.58
	Small club	8	0.32±2.00	0.18±0.62
	Significance level		N.S	N.S

** P≤ 0.01

N.S: non-significance

Rare studies referred to the effect of sex chromatin shapes on reproductive performance in domestic animals. AL-Rubaeae [3] reported that a significant variance in fertility rate according to sex chromatin shape in Iraqi sheep, the results indicated that the sheep with sessile nodule sex chromatin shape were the highest fertility rate compared with the other groups. Al-Rubaeae [17] indicated that sessile nodule sex chromatin shape increased the ratio of prolificacy

significantly in Turkish Awassi sheep. Raoof *et al.* [18] indicated that sex chromatin affected significantly on fertility rate and prolificacy and referred to high rate in goat with sessile nodule while the lowest rate in goat with a tear drop in both Local (Black) and Shamigoat breeds in Iraq. Mortality rate of kids from birth to weaning was reported to range from 32 to 40 % in different goat breeds [19]. Most of the studies have ascribe the high mortality rate in goat to management and environmental factors.

In table (3), results showed a significant regression of litter size on sex chromatin axis in Shami breed.Positive and significant regression (P<0.01) of litter size on vertical and horizontal axis of nuclei and the number of nuclear lobs namely,0.153% / um, 0.182 % / um and 0.001 % / lob respectively. Significant and positive regression (P<0.05) of litter size on horizontal axis of sex chromatin (0.463% / um).

Table 3: Regression of mortality and litter size on sex chromatin axis in Shami.

Traits	Regression coefficient	Equations of prediction	L.S
Regression of litter size on :			
Vertical axis of nuclei	0.153 % / µm	y^ =0.423 + 0.153(X)	**
Horizontal axis of nuclei	0.182 % / µm	y^ =0.414+0.182(X)	**
Vertical axis of sex chromatin	0.162 % / µm	y^ =1.637+0.162(X)	ns
Horizontal axis of sex chromatin	0.463 % / µm	y^ =1.425+0.463(X)	*
Sex chromatin area	0.017 % / µm²	y^ =1.698 +0.017(X)	ns
No. of nuclear lobs	0.001 % / lob	y^ =1.812 +0.001(X)	**
Regression of livability on:			
Vertical axis of nuclei	- 0.022 % / µm	y^ =0.837-0.002(X)	*
Horizontal axis of nuclei	0.0003 % / µm	y^ =0.624 + 0.0003(X)	ns
Vertical axis of sex chromatin	- 0.100 % / µm	y^ =0.747 - 0.100(X)	ns
Horizontal axis of sex chromatin	- 0.035 % / µm	y^ =0.665 -0.035(X)	ns
Sex chromatin area	- 0. 003 % / µm²	y^ =0.656 -0.003 (X)	ns
No. of nuclear lobs	- 0.0007 % / lob	y^ =0.638-0.007(X)	*

NS: non-significance, LS: level of significance, ** P≤ 0.01, * P≤ 0.05

Negative and significant regression (P<0.05) of livability on the vertical axis of nuclei and the number of nuclear lobs namely, - 0.022 % / um and – 0.0007% / lob respectively and no significant regression of livability on horizontal and vertical axis of sex chromatin, horizontal axis of nuclei and sex chromatin area.

Results represented in table 4 showed a positive and significant regression (P< 0.01) of litter size on vertical and horizontal axis of nuclei and the number of nuclear lobs namely, 0.090%/ um, 0.232 % / um and 0.189 % / lob respectively. Negative and significant regression (P<0.05) livability on the vertical axis of nuclei and the number of nuclear lobs namely,- 0.004% / um and - 0.0005% /lob respectively. Non-significant regression of livability on the horizontal axis of nuclei, vertical and horizontal axis of sex chromatin and the number of nuclear lobs.

Table 4: Regression of livability and twin rates on sex chromatin axis in local goat breed.

Traits	Regression coefficient	Equations of prediction	L.S
Regression of litter size on :			
Vertical axis of nuclei	0.090 % / µm	y^ =0.423 + 0.090(X)	**
Horizontal axis of nuclei	0.232 % / µm	y^ =0.414+0.232(X)	**
Vertical axis of sex chromatin	0.035 % / µm	y^ =1.637+0.035(X)	ns
Horizontal axis of sex chromatin	0.088 % / µm	y^ =1.425+0.088(X)	*
Sex chromatin area	0.006 % / µm²	y^ =1.698 +0.006(X)	ns
No. of nuclear lobs	0.189 % / lob	y^ =1.812 +0.189(X)	**
Regression of livability on:			
Vertical axis of nuclei	- 0.004 % / µm	y^ =0.837-0.004(X)	*
Horizontal axis of nuclei	0.0002 % / µm	y^ =0.624 + 0.0002(X)	ns
Vertical axis of sex chromatin	- 0.091 % / µm	y^ =0.747 - 0.091(X)	ns
Horizontal axis of sex chromatin	- 0.031 % / µm	y^ =0.665 -0.031(X)	ns
Sex chromatin area	- 0. 001 % / µm²	y^ =0.656 -0.001 (X)	ns
No. of nuclear lobs	- 0.0005 % / lob	y^ =0.638-0.005(X)	*

NS: non-significant, LS: level of significance, ** P≤ 0.01 * P≤ 0.05

Reproductive traits are very important in domestic animals and improve this traits by using direct selection is still very slow because of low heritability. Therefore, indirect or markers assisted selection can used as efficient method to improve performance. Al-Rubaeae [17] reported that a significant effect (P<0.05) of sex chromatin shape on litter size.

4. Conclusion

From the results of this study we can conclude that although the management and environment plays an important role in reproductive traits and mortality in domestic animals, genetic selection to sex chromatin shape and dimensions traits will contribute in increasing reproductive efficiency and decrease mortality rates under farming conditions.

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6. Reference

1. Debela G, Duguma M, Hundssa F. Effect of Different

Factors on Mortality Rate of Arsi- Bale Kids in Mid Rift Valley of Ethiopia. Global Veterinaria. 2011; 6(1):56-60.
2. Food and Agriculture Organization, (FAO). Official Statistics, Rome. Available from: http://www.faostat.fao.org/default, 2006, Aspx. Accessed on 02-01-2015.
3. Food and Agriculture Organization, (FAO). Online: http://faostat.fao.org/. FAOSTAT© FAO Statistics Division 2013.
4. Brito LF, Silva FG, Meleo ALP, Caetano GC, Torres RA, Rodrigues, Menezes JRO. Genetic and environmental factors that influence production and quality of milk of Alpine and Saanen goats. Genetic and Molecular Research. 2011; 10(4):3794-3802.
5. Hailu Dadi, Mieso Guru, Nigatu Alemayehu, FufaDawo, Gamada Duguma. The Effect ofenvironmental factors on preweaning survival rateof borana and Arsi-Bale kids. Small Ruminant Research, 2006; 66:291-294.
6. Mtenga LA, Kifaro GC, Berhanu B. Studies on factors affecting reproductive performance and mortality rates of small East African goats and their crosses. Available from:http://www.fao.org/Wairdocs/ILRI/x54728/x5472 b0f.html, 2006, Accessed on 01-12-2014.
7. AL–Najjar K, Salhab S, AL- Merestani R, Kasim R, AL-Azzawi W, Dawa M, Omid H, Saatci M. Environmental Factors Affecting Kid Mortality in Shami Goats.Kafkas Univ Vet Fak Derg 2010, 16(3):431-435.
8. Sahara MG, Sawaimul AD, Ali AZ, Kolte BR. Kidding Percentage and Twinning Ability in Osmanabadi goat in Vidarbha Climatic Condition. Nagpur Veterinary College, Nagpur-440006(M.S). Veterinary World. 2009; 2(2):60-61.
9. Gupta PK. Genetics. Published by Raakesh Kumar rastogi for rastogi, printed at Capetal offset press, New Delhi, India, 2009.
10. Lee JT. Functional intergenic transcription: acase study of the X-inactivation centre. Phil.Trans.Proceedings of the Royal Society of London. Series B. 2003; 358:1417-1423.
11. Geetha N. Text book of Medical physiology. 2nd Edition. Published by Divyesh arvind kothary for paras medical publisher, 2010.
12. AL-Khazraji WJ. Role of Sex chromatin &Cytoplasmic inheritance in performance of Turkish Awassi Sheep. A Dissertation submitted to the Council of the College of Agriculture at the University of Baghdad, 2011.
13. Carr SM. Barr bodies: hetrochromatinizedchromosomes. www.mun.ca/ biology/scar/Barr_bodies, 2007.
14. Coles EA. Veterinary Clinical Pathology. 4th edi. Sannders W. B. Co. Philadelphia. London, 1986, 124 - 127.
15. SAS. SAS / STAT `Users` Guide for Personal Computers. Release 6.12. SAS Institute Inc., Cary, NC., USA. 2012.
16. Okonkwo JC, Omeje IS, Egu UN. Identification of X-chromatin and determination of its incidence in Nigerian goat breeds.Livestock Research for Rural Development, 2010, 22(12). (abstract). http://www.lrrd.org/lrrd22 /12/okon22228.htm.
17. Al-Rubaeae HM. Study on Figures of sex Chromatin in relation to some blood characteristics and prolificacy in Shammi (Damascus) andlocal does. Karbalaa Journal Science. 2015; 13:57-68.
18. Raoof SO, Yahya SS, Brikhader D, Sheakh MYA. Role of sex chromatin on performance in the local (black) goats. Agriculture College/ Salahaddin University/ Erbil.Journal of Biotechnology Research Center, 2016, 10(1).
19. Donkin EF, Boyazoglu P. Diseases and mortality of goat kids in a South African milk goat herd.South African Society for Animal Science. 2004; 34:220-223.