Annals of Agricultural Science (2013) 58(1), 1–3

Faculty of Agriculture, Ain Shams University

Annals of Agricultural Science

www.elsevier.com/locate/aoas

ORIGINAL ARTICLE

Influence of age and live body weight on daily milk yield of Zaraibi and Shami goats in Sinai, Egypt

S.M. Alsheikh *

Animal and Poultry Division, Desert Research Center, Mataryia, Cairo, Egypt

Received 1 August 2012; accepted 15 August 2012
Available online 7 March 2013

KEYWORDS

Age;
Weight;
Daily milk yield;
Zaraibi and Shami goats

Abstract The objective of this work was to study the relationship of daily milk yield (DMY) on age and live body weight on of Zaraibi and Shami goats in Sinai, Egypt. Fifty lactated Zaraibi and 60 lactated Shami goats were used to record the DMY (g) during March–August 2009. Age of the both studied breeds was ranged from 24 to 72 months. Weight was ranged from 20 to 33 kg in Zaraibi and from 25 to 40 kg in Shami. Data of DMY were statistically analyzed to obtain the partial regression coefficients of DMY on age and weight within each studied breeds. Two models were used to estimate the partial linear and/or quadratic coefficient of DMY on age and weight. According to the results of model 1, Model 2 was done for DMY on age as linear and weight as linear and quadratic in Zaraibi. While, in Shami model 2 was done for DMY on age and weight as linear only.

Results indicated that DMY of Zaraibi and Shami were 576 ± 9.7 and 587 ± 9.2 g, respectively. In model 1, partial linear and quadratic regression coefficient estimates in Zaraibi for DMY on age were (b_1) 1.93 g/mo and (b_2) −0.03 g/mo^2 and on weight were (b_3) 121 g/kg and (b_4) −2.17 g/kg^2, respectively. These result indicated that relationship of DMY on weight was negative curve-linear. While, partial regression coefficients in Shami goat were −0.49, 0.01, 32.75 and −0.37 for b_1, b_2, b_3 and b_4, respectively.

In model 2, the linear relationship of DMY on age (b_1 = −1.38 g/mo) in Zaraibi became negative and significant ($p < 0.05$). While, of DMY on weight have the same trained as model 1. In Shami the linear relationship of DMY on age (b_1 = 0.46 g/mo) became positive and not significant ($p > 0.05$). While, of DMY on weight became highly ($p < 0.01$) significant (b_3 = 9.06 g/kg).

Introduction

Goats are of the most important component of animal production economic. They live under hard environment conditions in arid and semi-arid areas. The total goat's population in Egypt was about 4.2 million heads (FAO, 2010). Egyptian Zaraibi goats originated in the arid hot region of Egypt near the border with Sudan (Mourad, 1993). Also, it is the highest

* Tel.: +20 01001431565.
E-mail address: journalaaru@yahoo.com
Peer review under responsibility of Faculty of Agriculture, Ain-Shams University.

ELSEVIER Production and hosting by Elsevier

0570-1783 © 2013 Faculty of Agriculture, Ain Shams University. Production and hosting by Elsevier B.V. Open access under CC BY-NC-ND license.
http://dx.doi.org/10.1016/j.aoas.2013.01.001

milk production and high prolificacy local breeds (Abdel-Raheam, 1998). Damascus is the original home of Shami goats, which considered being one of the Arab breeds, which is famous for high milk production and high reproduction efficiency. It has been exported from Syria to many Arab countries including Egypt (ACSAD, 1998). Many of the researchers reported that the productivity of goat milk is affected by many factors, including age and live body weight (Manson, 1981; Mavrogenis et al., 1984; El-Gallad et al., 1988). The objective of this work was to study the type of the relationship of daily milk yield on age and live body weight of Zaraibi and Shami goats in South Sinai governorate in Egypt.

Materials and methods

Herd management

Egyptian Zaraibi and Shami goat herd was established in year 2006 at South Sinai Research Station located at Ras Sudr City, South Sinai Governorate belonging to Desert Research Center, Ministry of Agriculture, Egypt. Animals were housed in semi open shaded pens. Feeds consisted mainly of concentrate feed mixture plus berseem hay (*Trifolium alexantrinum*) and rice or wheat straw all the round of the year. The concentrate feed mixture consisted of cottonseed cake, maize, wheat or rice bran, calcium carbonate, and sodium chloride. The average crude protein is 14%, this mixture was fed once a day and water was available at any time of the day.

Data collection and handling

Fifty lactated Zaraibi and 60 lactated Shami does goats were used to record the daily milk yield DMY (g). DMY was recorded during 1st of March to 25th of August 2009. DMY was individually recorded at the first week of kidding just after colostrum days and then once a week up to 20 weeks. Does were kept away from their kids for 12 h (over night), and then one teat was hand milked. So, DMY was recorded as amount of milking milk multiplied by 4. Goat's age within each breed were ranged from 24 months to 72 months. The Zaraibi does weights were ranged from 20 kg to 33 kg and Shami does weights were ranged from 25 kg to 40 kg (Table 1).

Statistical analysis

Data of DMY within each breed were analyzed using regression analysis (PROC REG (SAS, 2003)) according to the following models:

$$\text{Model1}: \quad Y = a + b_1 A + b_2 A^2 + b_3 W + b_4 W^2 + e$$

where Y = daily milk yield, a = intercept, A = independent variable, age, W = independent variable, weight, b_1 and b_2 = are partial linear and quadratic regression coefficients of DMY on age, b_3 and b_4 = are partial linear and quadratic regression coefficients of DMY on weight, e = residual term assumed to be NID $(0, \sigma_e^2)$.

Model 2: According to the results obtained in model 1, the quadratic degree of weight was removed from this model in Zaraibi. While, in Shami quadratic degree of both age and weight were removed.

Results and discussion

Results demonstrated (Table 2) that the DMY estimates of Zaraibi and Shami were 576 ± 9.7 and 587 ± 9.2 g, respectively. These results were less than those reported by Abdel-Raheam (1998) who found that milk yield was 140 kg/season (season = 166 days) in Zaraibi goats in Egypt. Besides, Mavrogenis et al. (1989) found that milk yield was 214 kg/season (season = 180 days) in Shami goats in Cyprus. These values were near to 598 g in Zaraibi (Said, 1983) and 612 g in Shami (El-Gallad et al., 1988).

The partial linear (b_1) and quadratic (b_2) regression coefficients of DMY on age and weight in Zaraibi goat were 1.93 g/mo and 0.03 g/mo^2 (Table 3). Results indicated that the estimate was not significant ($p > 0.05$). This result was disagreement with Abdel-Raheam (1998) in Zaraibi goat. While, the partial linear (b_3) and quadratic (b_4) regression of DMY on weight was highly significant ($p < 0.01$) (121 g/kg, −2.17 g/kg^2). Results indicated that the relationship of DMY on weight was curve-linear. In agreement, Said (1983) found that DMY and weight relationship was nonlinear and significant ($p < 0.05$) in Zaraibi goats in Egypt. In model 2, when removed the quadratic term of age from the model, the linear relationship of DMY on age ($b_1 = -1.38$) became negative and significant ($p < 0.05$). While, the relationship of DMY on weight have the same trained as model 1. It could observed that, in both models, curve-linear relationship of DMY on weight of Zaraibi goat and highly significant ($p < 0.01$).

The partial linear (b_1) and quadratic (b_2) regression coefficients of DMY on age and weight in Shami goat were −0.49 g/mo and 0.01 g/mo^2, respectively (Table 4). Results indicated that estimate of both b_1 and b_2 was not significant ($p > 0.05$). These results in agreement with Mavrogenis et al. (1989) in Shami goat. While, the partial regression coefficient b_3 and b_4 (model 1) on weight were 33 g/kg and −0.37 g/kg^2. Also, both b_3 and b_4 was not significant ($p > 0.05$). This result was compatible with Hermiz et al. (1998) in Shami goats in Iraq. These results of model 1 indicated that relationship of DMY on age and on weight was linear. In model 2, when removed the quadratic degree of age and weight from the model 1, the linear relationship of DMY on age ($b_1 = 0.46$) became

Table 1 Distribution of Zaraibi and Shami does due to age and weight.

Breed	No.	Age (months)				Weight (kg)			
		Min	Max	Mean	se	Min	Max	Mean	se
Zaraibi	50	24	72	47	2.1	20	33	26	0.5
Shami	60	24	72	48	1.9	25	40	31	0.6

Table 2 Daily milk yield estimates in grams and their standard errors (se) for Zaraibi and Shami breeds.

Breed	Mean	se
Zaraibi	576	9.7
Shami	587	9. 2

Table 3 Partial regression coefficients (b's) for daily milk yield on age and weight of Zaraibi.

Variable	Model 1			Model 2		
	df	Estimate	se	df	Estimate	se
b_1 (g/month)	1	1.93	3.960	1	−1.38*	0.594
b_2 (g/month^2)	1	−0.03	0.041	–	–	–
b_3 (g/kg)	1	121.02**	36.531	1	116.83**	36.082
b_4 (g/kg^2)	1	−2.17**	0.679	1	−2.08**	0.670
MSE	45	3862.92	46	3839.05		
R^2 (%)		33		28		

MSE = mean square error.
* $p < 0.05$.
** $p < 0.01$ and otherwise is not significant.

Table 4 Partial regression coefficients (b's) for daily milk yield on age and weight of Shami.

Variable	Model 1			Model 2		
	df	Estimate	se	df	Estimate	se
b_1 (g/month)	1	−0.49	4.395	1	0.46	0.624
b_2 (g/month^2)	1	0.01	0.045	–	–	–
b_3 (g/kg)	1	32.75	33.28	1	9.06**	2.059
b_4 (g/kg^2)	1	−0.37	0.514	–	–	–
MSE	55	5298.58	57	5250.47		
R^2 (%)		28		27		

MSE = mean square error.
** $p < 0.01$ and otherwise is not significant ($p < 0.05$).

positive and not significant ($p > 0.05$). While, the linear relationship of DMY on weight became highly ($p < 0.01$) significant ($b_3 = 9.06$). It could observed that, in model 2, the linear relationship of DMY on weight of Shami goat was linear and highly significant ($p < 0.01$).

Conclusion

DMY in this study was less than that obtained in other investigations. Using different regression models let to the same relationship of DMY on weight of Zaraibi does. According to the both models, relationship of DMY on weight was curve-linear in Zaraibi does, which might indicated the importance of weight to predict the milk yield of Zaraibi does. So, DMY was increased by about 116–121 g when weight of Zaraibi does was increased by 1 kg. This increase was decreased by about 2–2.7 g when weight was increased by 1 kg. While, in Shami does in model 2 only, the linear relationship of DMY on weight was observed.

References

Abdel-Raheam, A.A., 1998. Genetic Studies on Zaraiby Goats. Ph.D. Thesis, Faculty of Agriculture, Ain shams, Univ., Egypt, p. 70.

ACSAD, 1998. Annual Report, Animal Livestock Unit (in Arabic).

El-Gallad, T.T., Gihad, E.A., Allam, S.M., Bedawy, T.M., 1988. Effect of energy intake and roughage ratio on the lactation of Egyptian Nubian (Zaraibi) goats. Small Ruminant Research 14, 327–331.

FAO, 2010. Food and Agriculture Organization. Food and Agriculture Organization, United Nations, Rome. < http://faostat.fao.org/site/573/DesktopDefault.aspx?PageID = 573#ancor > .

Hermiz, H.N., Asofi, M.K., Al-Rawi, A.A., 1998. Some genetic and nongenetic causes of variation in milk traits of Iraqi local goat. In: Proc. 6th World Congr. Genet. Livest. Prod. Junuary 11–16. Armidale, New South Wales Australia, vol. 25, pp. 517–520.

Manson, I.L., 1981. Wild Goats and their Dome Situation, Goat Production. Academic Press, London, pp. 33–35.

Mavrogenis, A.P., Constantion, A., Louca, A., 1984. Environmental and genetic causes of varation in production traits of Damascus goats. 1. Pre-weaning and post-weaning growth. Animal Production 38 (1), 91–97.

Mavrogenis, A.P., Papachristoforou, C., Lysandrides, P., Roushias, A., 1989. Envirnomental and genetic effects on udder characteristics and milk production in Damascus goats. Small Ruminant Research 2, 333–343.

Mourad, M., 1993. Reproductive performance of Alpine and Zaraibi goats and growth of their first cross in Egypt. Small Ruminant Research 12, 379–384.

Said, M.M., 1983. A Study on Some Productive Traits of Egyptian Goats. M.Sc. Thesis, Faculty of Agriculture, Moshtohor, Zagazig Univ., Egypt p. 117.

SAS, 2003. SAS/STAT User's Guide, Version 8. Cary, NC: SAS Institute Inc., North Carolina, USA.