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STUDY OF THE EFFECTS OF WEIGHT AND AGE ON THE MILK STRUCTURE OF AWASSI SHEEP IN SOUTH BABYLON, IRAQ

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Abstract

This study was conducted with the aim of knowing the effect of weight and age of Awassi sheep on the structure milk, South Babylon. This study was conducted in the Animal Production Department, College of Agriculture, Al-Qasim Green University and College of Food Sciences, Al-Qasim Green University. As the study included 59 sheep in a good health in the stage of Lactation stage and it relies on free range for nutrition, as it is herding in the south of Babylon province. The ages and weights of the sheep were recorded, then the milk samples were collected and transferred to the laboratory in refrigerated containers for the necessary tests on milk. The results indicated that the maternal weight had a significant effect (P <0.01) on the percentage of fat in all groups. The highest percentage of fat in milk at weights was 45-55 kg, and the weight of sheep affected the ratio of fat, protein, lactose and non-solid fatty substances. The effect was significantly P <0.01) on all groups. The percentage of fat, protein, lactose and non-fatty solids increased with weight gain and the effect was significant (P <0.01)). As for the maternal age, it had a significant effect on the percentage of fat, protein, lactose and also non-fat solids in milk (P <0.05). As the concentration of fat, protein, lactose and non-fatty solids increased with increasing maternal age, the highest effect on sheep that reached more than 40 maternal age was at a significant level (P <0.05). The percentage of fat was correlation with maternal weight and age significantly (P <0.01), while the correlation of the protein ratio with the maternal weight at birth was insignificant. As for the correlation of the maternal age with the protein percentage, it was significant (P <0.01). The lactose ratio was significantly correlated with the maternal age (P <0.05). As for its correlation with weight, it was at a significant level (P <0.01). The maternal age at birth was correlated with the concentration of non-fatty solids in milk with a significant level of (P <0.01). Also, the studied traits among them were significantly related in relation to the relationship between the percentage of fat and protein, the percentage of fat and lactose, the ratio of protein and lactose, and the effect was significant when all the studied traits were related to each other at the level of significance (P <0.01) except for the correlation of the relative intensity with the studied traits It was non-significant in all groups. From here it became clear to us that special mechanisms must be put in place by sheep farmers to increase the weights of sheep and focus on nutritional payment because of its direct and large impact on the concentration and the structure milk, which will benefit the breeders in terms of increasing the weights of lambs and thus the economic aspect.

***Keywords*:** Weight, age, Awassi sheep, South Babylon

Introduction

Sheep constitute the basis of animal production in the Arab world, for the important products they provide, and Awassi sheep strain are among the most important strain of sheep in semi-arid and dry regions in the Arab region (Tulaimat, 1996; Kaskous and Lengerken, 1997). Sheep milk (sheep-goats) is healthier than cow's milk. Studies have shown that goat's milk is closer to breast milk and that sheep's milk is more greasy than cow's milk (Hanlein, 2002). Lactose is the milk sugar responsible for the sweet taste of milk and can be found in general mammal milk (Mangino, 2007). Lactose increases the absorption of iron and calcium in the body, which is necessary for the development of the nervous system and the development of children's brains (Hurley, 2001). Milk contains all the vitamins that are soluble in fat and those that dissolve in water, some of which appear in large quantities and which constitute a major food source and some of which appear in small and insignificant amounts (Garton, 2011). Milk contains fats, proteins, sugars, vitamins and minerals, and the proportions of these compounds differ according to the milk source. It also contains a heterogeneous mixture of enzymes and peptides and small amounts of nitrogenous molecules which are not protein (Kanaanah, 2011). Milk production depends on the ability of the epithelial cells present in the mammary glands to extract their nutrients from the blood and their abundance to create milk components and maintain a balance between blood and milk components, as these cells use about 80% of the available elements in the blood to synthesize milk (Jelinek, et al, 1996). The quality and quantity of Feeding Materials that the animal consumes affect the quantity and the structure milk. The less fibre in the diet and the more energy-rich Feeding Materials, The percentage of fat in milk increased and vice versa (Alsafar *et al.*, 1982). In this regard, studies indicated that the addition of high protein sources in their content of non-dissolving protein in rumen to diets components led to an improvement in the level of milk production and an increase in the weights of lambs due to the increased use of amino acids and the energy present in the non-dissolving protein in rumen (Cannas *et al*., 1995). Aljumaily (2001) and (Peana *et al.*, 2007), as well as (Abdullah *et al*., 2008) have shown that the maternal age at birth, the birth season and the time of milking, as well as the strain, are among the most important factors affecting milk production and the length of the production season. While (Al-Khalisi, 1996) and (Al-Azawi *et al.*, 1997) due to the cause of the variation in milk production for Awassi sheep to the type of birth, the gender of the newborn, and the genetic group, where (AL-Samrai *et al.*, 2009) observed that local Awassi sheep could Respond to genetic improvement to increase milk production. The milk components and determining their ratio occupied the researchers' interest in their extreme importance in knowing the nutritional value of the produced milk because it is a major source for feeding

lambs during the first weeks of life and for the manufacture of dairy products, which have a high nutritional value. Secondly, and due to the lack of studies on dairy sheep, this study came to know some factors that affect the composition of milk.

Materials and Methods

Milk samples were collected from 59 in a good health sheep's in the lactation stage from different regions south of Babylon province, where the weight and age of the sheep were recorded and then the lambs were prevented from feeding for 4 hours. After washing and sterilizing the udder, milk was collected (a full milking), Then it took a sample of the collected milk by 20 ml and put it in special tubes to collect the milk. the samples were put in a refrigerated container containing ice and transferred to the laboratory. The samples were removed from the reefer container and placed in a 40 °C water bath to heat the milk. Then we filtered the milk using sterile gauze. The milk components were then measured using the Danish Milkoscan Model 104, A / SN, Foss Electric Company, Danish-made (Zannoni and Annibaldi, 1981).

Statistical analysis

The data were analyzed statistically by using the Statistical Analysis System –SAS (2012) program to study the effect of weight and age of mothers at birth, and the gender of the newborn in the milk components and The significant differences between the averages were compared using the Duncan (1955) polynomial test by applying the Least square means.

Mathematical model: Investigation of the relationship of factors studied in different milk components.

$$Yij = \mu + Ti + eij$$

where

Yij: the value of viewing j to treatment i.

μ: general average for the trait.

Ti: effect of treatment i (the study included the effect of five treatments).

eij: a random error that is normally distributed with an average of zero and a variation of $\sigma^2 e$

Results and Discussion

Table (1) we note the effect of maternal weight at birth on the concentration of milk components (fat%, protein%, lactose%, and non-fatty solids %) where weight had a significant effect on all of these compounds with a high level of significance ($P < 0.01$). The highest in weights is 45-55 kg. This is due to that the percentage of fat in sheep milk is greatly affected by external factors, especially nutrition, and this is consistent with the results (Tulaimat, 1996) and does not agree with what other researchers have found, including Fadel, 1988 and AL-Hilaly, 1995.

Table (2) shows that the maternal weight at birth affected significantly in all components of milk in Awassi sheep except for the relative density, the effect was not significant. As this study showed that with increasing maternal age at birth, the concentration of (fat%, protein%, lactose sugar %) and percentage of non-fat solids in milk increases. The reason for this effect is due to the development of the milk system responsible for producing milk, as it is accompanied by an increase in the size of the gut and an increase in the utilization of feeding materials, which reflects positively on the milk components and this agrees with the study of researchers (Abdullah *et al*., 2008).

Table (3) included the correlation of the maternal weight at birth with the milk components, where it was observed from these results that the correlation was significant among all the milk components with the maternal age and weight at birth and this confirms what was mentioned in previous research that the age and weight of the ewe and the stage of milk production Direct effect on the structure milk. These results agree with (Al-Muhammedi, 2013) in Turkish Awassi sheep which showed an increase in the percentage of milk components (fat, protein, and lactose sugar) with the age of the sheep. Also, these results were consistent with the researchers (Abd allah, 2011 Vacca, 2010; Yilmaz *et al*., 2004).

Table (4) showed the correlation of the milk components with each other, where a significant correlation was observed between the proportions of the milk components with each other where the correlation of the fat and protein ratio was (0.70), which is a highly significant correlation. The fat content in sheep milk is affected by many external factors, especially nutrition. The varying values for researchers are due to the different conditions of care and nutrition, environmental factors, and other genetic factors. Researchers have found that the ratio of the fat percentage to the protein content in the milk of Awassi sheep is because it is affected by the same factors in terms of nutrition, production stage, genetic factors in addition to environmental factors. All of these factors combined show their effect on the percentage of fat and protein in milk, and this is consistent with (Nikolaou, 1992; Vrayle-Anesti and Malher, 1994). As for the correlation of the fat percentage with the lactose ratio (0.71) with a high significance, as the sugar percentage is not affected by environmental factors as in the fat and protein ratio, as it plays an important role in the osmotic balance inside the udder, and remains within the normal limits except for the first days during the colostrum production stage, Where the mechanism of the formation of sugar in the udder is not sufficiently developed, and the proportion of sugar decreases at the end of the milking season as well, while the proportion of other ingredients is high at the beginning and end of the milking season. This is consistent with what the researchers found (Al-Hamdani, 2000, Al-Dabbagh and Al-Anbari, 2011). The results also showed a significant correlation between the percentage of fat and the ratio of solids (0.71). Also, the protein and lactose ratio (0.99) was significantly correlated, protein and non-fatty solids were significantly (0.99), and the lactose and non-fatty solids were significantly (0.99). These results agree with (Al-Jawary, 2009) and (Al-Habiti, 2005) who found inverse relationships between milk production and the percentage of fat and protein, and the results also increased with the percentage of fat and protein together in East Fresian ewe milk with the results of researcher (Kuchtik *et al.,* 2008).

Table 1: The effect of maternal weight at birth on the structure milk of Awassi sheep / Southern Babylon

Average ± standard error					Maternal weight at birth (kg)
Non-fat solids (%)	The relative density(%)	Lactose content (%)	Protein content (%)	Fat percentage (%)	
0.68 ± 9.58b	0.001 ± 1.028a	0.38 ± 5.36b	0.25 ± 3.53b	0.82 ± 6.34b	Less than 45 kg
0.32 ± 12.09a	0.013 ± 1.053a	0.18 ± 6.76a	0.12 ± 4.46a	0.53 ± 9.17a	45-55 kg
0.39 ± 11.07a	0.002 ± 1.033a	0.22 ± 6.20a	0.14 ± 4.09a	0.61 ± 7.89ab	More than 55 kg
**	NS	**	**	**	Level of significance
NS :Non-significant. (P<0.01) The averages that have different letters within one column differ significantly among themselves.					

Table 2: The effect of maternal age at birth on the structure milk of Awassi sheep / Southern Babylon

Average ± standard error					Maternal age at birth (Month)
Non-fat solids (%)	The relative density(%)	Lactose content (%)	Protein content (%)	Fat percentage (%)	
0.63 ± 10.19b	0.001 ± 1.045a	0.44 ± 5.71b	0.23 ± 3.76b	0.84 ± 6.66b	Less than 30 months
0.47 ± 11.64a	0.002 ± 1.044a	0.37 ± 6.51a	0.30 ± 4.29a	0.71 ± 8.73a	30-40 months
0.67 ± 11.89a	0.002 ± 1.035a	0.52 ± 6.66a	0.24 ± 4.30a	0.87 ± 9.16a	More than 40 months
*	NS	*	*	*	Level of significance
NS :Non-significant. (*P<0.05) The averages that have different letters within one column differ significantly among themselves					

Table 3: Correlation coefficient between the weight and age of the maternal at birth with structure milk Awassi sheep / Southern Babylon

Correlation coefficient(r)		Milk traits
Maternal age at birth	Maternal weight at birth	
** 0.29	** 0.42	Fat percentage (%)
** 0.34	0.17NS	Protein content**(%)**
** 0.34	* 0.25	Lactose content (%)
0.08-NS	0.04NS	The relative density (%)
** 0.34	* 0.25	Non-fat solids (%)
NS :Non-significant, (*P<0.05), (**P<0.01)		

Table 4: Correlation coefficient between with the structure milk Awassi sheep / Southern Babylon

Level of significance	Correlation coefficient(r)	Associated components
**	0.70	Fat %and protein%
**	0.71	Fat %and lactose%
NS	0.19	Fat% and relative density%
**	0.71	Fat % and Non-fat solids (%)
**	0.99	Protein % and lactose%
NS	0.13	Protein% and relative density%
**	0.99	Protein % and Non-fat solids (%)
NS	0.13	Lactose% and relative density
**	0.99	Lactose % and Non-fat solids (%)
NS	0.12	Relative Density % and Non-Fatty Solids%
Non-significant :NS ،(P<0.01) **		

References

Aljumaily, M.H.A. (2001). Study of some traits of growth and commercial milk production, Master Thesis - College of Agriculture - University of Baghdad.

Al-Jawary, M.F.A.O. (2005). Use of daily checks to produce milk to choose Awassi ewes. Master Thesis. College of Agriculture and Forestry - University of Mosul - Iraq.

Al-Habeiti, A.Q.H. (2005). The relationship between the formative form of the udder, milk production and some of its components in Awassi sheep, PhD thesis - College of Agriculture and Forestry, University of Mosul.

Al-Hamdani, W.A.Q. (2000). Study the effect of some environmental and physiological factors on milk production and its composition in genetic groups of goats. Doctorate thesis. Agriculture College. Baghdad University. Iraq.

Al-Khalisi, Abbas Fawzi Sadiq. 1996. Study of the curve of milk production in Awassi sheep and their strikes, Master Thesis - College of Agriculture - University of Baghdad.

Al-Dabbagh, Salim Abdel-Zahra and Al-Anbari, Nasr Nouri and Hadi, Fandia Hussein, Sheikho, and Sodeh Seena (2011). The effect of the relationship between the type

of birth, the stage of milk production and its main components for shami goats raised in Iraq. Iraqi Journal of Agriculture Research 16(6): 173-181.

Alsafar, T.A.R.; Omar, M.O. and others (1982). Liquid milk. First edition. National Library, Baghdad, Iraq.

Al-Muhammadi, D.S.H. (2013). Genetic evaluation of milk production in Turkish Awassi ewes using two methods of measuring milk. Ph.D. thesis. Faculty of Agriculture. Baghdad University, Iraq.

Tulaimat, F. (1996). The Encyclopedia of Arab Sheep, Biological Diversity Project in the Arab Countries - The Arab Center for Studies of Arid Zones and Dry Lands - ACSAD - Damascus.

Abdullah, R.K. and Aref, Q.H. (2008). The effect of age and milking stage on the amount of milk produced and some of its components in Awassi sheep, Iraqi Journal of Veterinary Science, 2(1): 53-57.

Kanaeanah, Y. and Aghbarieh, J. (2011). Milk Chemistry Book.

Al-Azzawi, W.A. and Al-Rawi, A.A. (1997). Repeatability estimates of some economic productive traits in Awassi sheep. IPA. J. Agric. Res. 7(1): 74-86.

AL-Hilaly, M.E.L. (1995). Cheese making from sheep and goat milk applying new technologies. A thesis submitted to the University of Aleppo in partial Fulfillment of the requirements for the Degree of Diploma in Higher Studies in Food Sciences.

Al-Hilaly, M.L. (1995). Cheese making from sheep and goat milk applying new technologies. A thesis submitted to the University of Aleppo in partial fulfillment of the requirement for the degree of Diploma in Higher studies in food sciences.

Al-Samrai, F.R. and Al-Anbari, N.N. (2009). Genetic evaluation of rams of total milk yield in Iraq Awassi sheep. APPN Journal of Agricultural Biological Science, 4(3): 54-57.

Abd-Allah, M.; Abass, S.F. and Allam, F.M. (2011). Factors affecting the milk yield and composition of Rahmani and Chios sheep. Int. J. Livest. Prod., 2(3): 024-030.

Cannas, A.; Pes, A. and Pulina, G. (1995). Effect of dietary energy and protein concentration on milk urea content in dairy ewes. Annual Meeting ADSA, Ithaca, New York, 25–28 June. Journal of Dairy Science 78 (Suppl.), 277.

Cannas, A.; Cabbidu, A.; Bomboi, G.; Ligios, S. and Molle, G. (2003). Effect of dietary non-fiber carbohydrate concentration on intake, in vivo digestibility and milk yield in sarda ewes. Proc. 45th Int. Mtg. EAAP, Rome, Italy. Wageningen Acad. Publ., Wageningen. Netherland.

Duncan, D.B. (1955). Multiple Rang and Multiple F-test. Biometrics. 11: 4-42.

Fadel, I. (1988). Economic and Technical Aspects of Lactation in Awassi Sheep with Special Reference to Simplified Recording and System Development Under the Semi-arid conditions. Ph.D. Thesis, University College of North Wales, Bangor, U.K.

Garton, G.A. (2011). The composition and biosynthesis of milk lipids.

Haenlein, G. (2002). Lipids and Proteins in milk, particularity Goat milk.

Hurley, W.H. The Lactation Biology website classes, ansci.illinois.edu/ansc483/milkcompysynth/milkcomp fat.html.

Jelinek, P.; Gajdusek, S. and Illek, J. (1996). Relationship between selected indicators for milk and blood in sheep. Small Rum. Res. (20): 53-57.

Kaskous, S.; Suss, R. and Lengerken, G. (1997). "Syrische Arabische Republik" shafhaltung unter extremen Bedingungen. Deutsche schafzucht verlag Eugen ulmer Stuttgart, 89: 304-306.

Malher, X. and Vrayla-Anesti, F. (1994). An evaluation of milk yield and milking ability in French Rouge de l'Ouest ewes. Sm. Rum. Res., 13:1-8.

Mangino, M. and Harper, J. (2007). Food Science lectures Ohio University.

Nikolaou, E.M. (1992). Studyof morphological, productive and reproductive characteristics of the Epirus Mountain breed of sheep. Doctoral thesis. Agricultural university of Athens, 77 pp.

Peana, I.C.; Dimauro, M.; Carta, M.; Gaspa, G.; Fois, A. and Cannas, M. (2007). Effect of heat stress on milk yield in Sardinian dairy sheep farms. Italian Journal Sci., 6: 581- 590.

SAS (2012). Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA.

Vacca, G.M.; Dettori, M.L.; Carcangin, V.; Rocchiglani, A.M. and Pazzola, M. (2010). Relationships between milk characteristic and somatic cell score in milk from primiparous browsing goats. Animal Science Journal, 81: 594– 599.

Yilmaz, O.; Denk, H. and Nursoy, H. (2004). Milk yield characteristics of Nordus sheep. YYU. Vet. Fak. Derg., 15(1-2): 27-31.

Zannoni, M. and Annibaldi, S. (1981). Sci. Tecn. Latt.-Cas., 32: 79-94.