THE COMBINED EFFECT OF SUCKLING SYSTEM AND WEANING WEIGHT ON MILK TRAITS OF NATIVE SHEEP

Najat J. Mohammed[1] **Jalal E. Alkass**
Researcher **Prof.**
Animal Production Department, College of Agricultural Engineering Sciences, University of Duhok, Iraq
[1]Corresponding author: Email:nljealkas@yahoo.com

ABSTRACT

Data of the current stud, were collected on 32 Iraqi native sheep aged 2-5 years maintained on commercial flock. At lambing, the 32 ewes were divided into two equal groups, lambs in the 1st group were left with their dams till weaning and then were milked twice daily till they dry off (Continuous), whereas the 2nd group, lambs were separated at night for 12 hr. and the ewes were milked once daily at morning (Restricted). Then each main group was subdivided into two group to be weaned their lambs when they reached 3 or 4 times of their birth weight (WB1 and WB2). Results revealed that ewes of restricted suckling produced significantly (P < 0.05) more post weaning (80.80 vs.49.44 L), total milk yield (135.01 vs. 109.94 L) and sealable milk (99.86 vs. 49.44 L) and had significantly longer lactation period (169.3 vs. 140.2 days) compared ewes in continuous suckling. Also, results obtained indicate that daily gain in weight averaged 0.23 kg from birth to weaning and from birth to marketing and 0.24 kg from weaning to marketing and neither suckling system nor weaning weight affected these trait significantly. It can be concluded that restricted suckling resulted in an increase in sealable milk without any adverse effect on growth of lambs.

Key words: suckling, weaning, milk sheep.

التأثير المشترك لنظم الرضاعة و وزن الفطام على صفات الحليب للأغنام المحلية

نجاة جاسم محمد جلال ايليا القس
الباحثة استاذ
قسم الانتاج الحيواني/كلية علوم الهندسة الزراعية – جامعة دهوك

المستخلص

تم جمع بيانات الدراسة الحالية من 32 نعجة عراقية محلية بعمر 2–5 سنوات و مرباة في أحد القطعان التجارية خلال موسم الولادة 2018–2019. تم توزيع النعاج بعد ولادتها إلى مجموعتين و تركت المجموعة الاولى لترضع مواليدها لحين الفطام باستثناء لدى تسجيل إنتاج الحليب أسبوعياً و من ثم حلبها مرتين يومياً لحين الجفاف (رضاعة مستمرة) . أما المجموعة الثانية إذ كانت الحملان تعزل عن امهاتها يومياً عندة المساء و لمدة 12 ساعة وعندة الصباح يتم حلبها وبعد فطام حملانها تم حلبها مرتين يومياً ولحين جفافها (الرضاعة المحصورة). تم توزيع نعاج المجموعة الرئيسية إل مجموعتين ثانويتين لتفطم حملانها لدى وصولها ثلاثة او اربعة اضعاف وزنها عند الولادة (1س ,2س). النتائج الى تفوق نعاج الرضاعة المحصورة في انتاجها من الحليب ما بعد الفطام (80.80 ±7.04 ,مقارنة ب 49.44± 10.01) انتاج الحليب الكلي (135.01 ± 8.67 مقارنة ب 109.94 ± 11.99)، والحليب التجاري (99.86 ± 7.47 مقارنة ب 49.44 ± 10.01) كما كان موسم الادرار اطول (169.333±5.653 مقارنة ب 140.285 ± 11.050) من نعاج الرضاعة المستمرة . كما وجد بان معدل الزيادة الوزنية اليومية من الولادة الى الفطام 0.23 كغم و من الفطام الى التسويق 0.24 كغم ولم يكن لنظم الرضاعة و الوزن عند الفطام تاثير معنوي في هده الصفات وعليه يكن الاستنتاج بان نظام الرضاعة المحصورة ادى الى زيادة انتاج الحليب التجاري و بدون التاثير على نمو الحملان.

الكلمات المفتاحية : رضاعة، الفطام, الحليب اغنام.

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INTRODUCTION

In sheep, lactation is the most important function not only because the ewe remain an important dairy animal, but because efficient lactation is the foundation for good lamb performance necessary in any system of production (22). In most sheep's production system, the ewes rear their lambs, but there are great variation in the length of time that lambs are suckled. However, attempts to maximize commercial milk yield and/or lamb growth, a variety of weaning and rearing systems for ewes and their lambs have been carried out since late 1960's, and several mixed systems for early lactation management of ewes allowing both suckling and milking were also investigated (6,10,11,18,23,28). It has been also indicated that early weaning associated with restricted suckling gave higher marketable milk without causing a negative impact on the growth of lambs and thus provide economic benefits to the farmer (6,13,16,17,19).Since there is a lack of information on the effect of different suckling regime and weaning system on lactation performance and growth of lambs in native sheep, therefore, this study aimed to compare commercial milk during lactation and lamb growth traits under two different system of suckling and weaning weight in native Iraqi sheep.

MATERIALS AND METHODS

Data processed during the course of the current study, were collected on commercial sheep farm maintained at Duhok province, over the period 30th November, 218 to 7thJune, 2019. Where a total of 32 native ewes aged 2-5 years and their single born lambs were used .

Animals and management

At 15-days post- lambing, the ewes were divided into two equal groups, lambs in the 1th group were left with their dams till weaning except where milk was recorded at weekly interval and then were milked twice daily till they dry off (Continuous), whereas the 2nd group, lambs were separated at night for 12 hr. and the ewes were milked once daily at morning till weaning and later twice daily till they dry off (Restricted). Then each main group was subdivided into two sub groups to be weaned their lambs when they reached 3 or 4 times of their birth weight (WB3 and WB4).All lambs were weighted at weekly interval till marketing.

Recording of milk:

Milk yield was calculated for both suckling system as follows:

For pre-weaning in restricted suckling = Daily milk yield X 2 X 7 days

For post-weaning in continuous and restricted suckling =Daily milk yield at morning + evening X 7 days

Total milk yield in restricted suckling = pre-weaning + post-weaning

Total milk yield in continuous suckling = post-weaning milk yield only.

Commercial milk yield: for restricted suckling = pre-weaning daily milk yield X7 days + post weaning milk yield

Lactation period was calculated from lambing date up to dry off (less than 100/g), where as milking period was calculated for restricted suckling from lambing to dry off, and for continuous suckling from weaning to drying off.

Feeding

Following lambing, all ewes with their lambs were kept in the farm for a period of three days, after that the ewes and their lambs were allowed to graze natural pasture from 9:00 am to 5:00 pm.Fifteen days post lambing, a concentrate mixture (15% crude protein and 2790 kcal/kg) was offered to ewes according to NRC (20) requirement.

Statistical analysis

General Linear model was used to estimate Best Linear unbiased effects of treatments on studied traits (SAS, 27). Duncan multiple range test (7) was used to test the differences between the sub classes of each factor. Since the interaction of all studied traits was not significant, therefore the interaction was excluded from the results.

RESULTS AND DISCUSSION

Results revealed that the overall means of pre-weaning, post-weaning, total, and commercial milk yield averaged 57.25 ± 3.22, 65.66 ± 6.63, 122.91 ±7.56 and 75.52 ± 7.72 L, respectively. Moreover, total milk yield recorded herein by native ewes is higher than those reported earlier for the Awassi in Iraq (3,14) as well as it is higher than those recorded earlier for karadi ewes (2,4,21).However, such value is very close to

those found earthier for Awassi ewes (126.05 L) and karadi ewes (126.39 L) by Alkass and Akreyi (1). Such differences in yield could be attributed to the genetic make-up of the animals, as well as conditions of ewes and feeding and management practices followed in different farms. It appears from Table 1 that milk yield produced by ewes during pre-weaning period in restricted and continuous suckling are 54.21 ± 4.42 and 60.50 ± 4.70 L, respectively and the differences between them was not significant ($p > 0.05$). Whereas, ewes in restricted suckling yielded significantly ($p < 0.05$) higher milk as compared to continuous suckling during post-weaning (80.80 vs. 49.44 L), total milk yield (135.01 vs 109.94 L), and sealable milk (99.86 vs. 49.44 L). This difference in post-weaning, total and commercial milk yield could be attributed to significantly longer period of lactation in restricted suckling (169.33 days) as compared to continuous suckling (140.28 days). The higher total milk yield of ewes and consequently commercial yield in restricted ewes is most likely due to more frequent udder evacuation, as compared with continuous suckling. Such increase in milk yield is consistant with the results found by Folman *et al.* (10), Gargouri *et al*. (11), Peris *et al*. (24) and Thomas *et al*. (29) and Dikmen *et al*.(6). This result demonstrate that the early lactation management of native ewes has a great impact on overall lactation performance. This finding showed that more commercial milk (50.64%) could be obtained when ewes will be milked once daily in addition to suckling up to weaning compared to ewes that will be only suckled their lambs during this period. Therefore, commercial milk yield of ewes can be increased by the application of restricted suckling system. Results presented in Table 1 revealed that ewes of BW4 produced significantly ($p < 0.05$) more milk (66.79 L) than do ewes in BW3 group (48.34 L) during pre-weaning period. This finding is obvious because lambs of BW3 reached their target weight at a shorter period (45.13 days) than those of BW4 (58.86 days). However, no significant differences between BW3 and BW4 exist in post-weaning, total and commercial milk yield. Similarly, working on Saanen and Alpine goats, Gokdal*et al*. (12) concluded that kids weaned at 3 times their individual birth weight yielded more milk (483.74 L) as compared with kids weaned when they reached four times of their birth weight (427.05 L). In the present investigation, it seems from Table 1 that the two systems of production yielded almost similar amount of milk at peak (776.42 vs. 773.66 ml) as well as when they attained their peak of production at a same time (38.71 vs. 39.20 days). Moreover, the PMY recorded herein is higher than the values obtained by Alkass and Akreyi. (1) for Awassi (617.33ml) and for karadi ewes ewes (626.56 ml), but it is lower than the amount (1.467 L) obtained by Merkhan (19) for the Awassi raised in another commercial farm. Such differences may be attributed to the differences in genetic make-up and different management and feeding system followed in each farm. Also, Mckusick*et al*. (18) found that greater peak milk yield was attained by ewes suckle their lambs for 9 hr in the morning and machine milked (2.93 kg) than ewes exclusively suckled by their lambs (2.56 kg) or ewes machine milked twice daily (2.81 kg). Lactation period averaged 169.33 and 140.28 days for ewes maintained in restricted and continuous suckling system, respectively; and the difference between them is significant ($p < 0.05$) (Table 1). The length of lactation recorded herein is longer than that reported earlier by other workers on Awassi ewes (3,9,14,19) as well as for karadi ewes (2), but it is almost similar to those indicated by Alkass and A keryi. (1) for Awassi (169.66 daya) and karadi ewes (168.71 days). The significant difference between the two suckling regime could be due to the act of suckling and milking rather than suckling only in continuous suckling group, so the ewes are more persist to milking for a longer period. It seems from Table 1 that ewes in continuous suckling group had significantly ($p < 0.05$) a shorter milking period (86.50 days) than did the ewes in restricted suckling ewes (169.33 days), because the ewes kept in continuous suckling were not milked during weaning period. Similar results have been reported by Dikmen*et al.* (6). With the regard to differences of weaning weight, it seems that lactation period and milking period are almost similar in both BW3 and BW4.

Table 1. The effect of suckling system and weaning weight on pre-weaning milk, post-weaning milk, total milk yield, commercial milk, peak milk yield, time to peak milk, milking period and lactation period of native ewes

Traits	Overall mean	Suckling system		Weaning weight*	
		Restricted	Continuous	BW3	BW4
No.	29	15	14	15	14
Pre-weaning milk yield	57.25 ± 3.22	54.21± 4.42 a	60.50± 4.70 a	48.34± 2.78 b	66.79± 4.87 a
Post-weaning milk yield	65.66 ± 6.63	80.80± 7.04 a	49.44± 10.01 b	73.63±11.19 a	57.12± 6.41 a
Total milk yield	122.91±7.56	135.01± 8.67 a	109.94±11.97b	121.97±12.01a	123.91±9.40 a
Commercial milk yield	75.52 ± 7.72	99.86± 7.47 a	49.44± 10.01 b	81.96±12.34 a	68.62± 9.11 a
Peak milk yield	775.0±39.63	776.42±61.27a	773.66±53.09a	782.50±56.13a	768.80±57.74a
Time to peak (days)	38.96± 1.79	38.71± 3.11 a	39.20± 2.20 a	39.92± 1.98 a	38.06± 2.98 a
Milking period days	129.34±10.12	169.33± 5.63 a	86.50± 12.15 b	132.46±16.93 a	126.0±11.17 a
Lactation period days	155.31± 6.56	169.33± 5.63 a	140.28 ± 11.05b	154.80±12.26 a	155.85±4.33 a

Means bearing different letters within each row is differ significantly (p<0.05)
*** BW3= Body weight at birth X3, BW4= Body weight at birth X4**

Growth rate of lambs

In the current investigation, the overall mean of weights at birth, weaning and marketing weights averaged 4.57 ± 0.14, 16.13 ± 0.35 and 28.95 ± 0.83 kg, respectively. Also, the daily gain in weight from birth to weaning, birth to marketing and weaning to marketing averaged respectively, 0.23 ± 0.01, 0.23 ± 0.01 and 0.24 ± 0.01. (Table 2).The average daily gain (0.23 ± 0.01 kg) attained in the present investigation is higher than those reported earlier for Awassi sheep in Iraq by Eliya and Juma (9), by Kazzal (15) and for Israeli Awassi in Cyprus by Cyprus ARI (5). However, the growth rate achieved by the lambs in both groups were similar to those found by Mckusick *et al*.(18) for East Friesian lambs, by Rodriguez *et al*.(26) for Assafi lamb, by Vieira *et al*. (30) for churra Spanish lambs and by Dikmen *et al*. (6) for Awassi. It appears from Table 2 that live body weights at weaning and marketing as well as daily gain in weights of lambs during suckling period and post-weaning in both restricted group and continuous suckling group are similar ($p > 0.05$). Such result is consistent with Louca (17), Gargouri *et al*. (11), Dikmen *et al*. (6), Lawlor *et al*. (16) Mckusick *et al*. (18), and Rodriguez *et al*. (26). Rassu *et al*. (25), who found that restricted suckling system has no detrimental effect either on growth of lambs until weaning or up to marketing weight. Thus the application of restricted management system did not affect the long-term growth which is in accordance with the findings of Economides and Antonous (8), Dikmen *et al*. (6) and Vieira *et al*. (30). It appears from Table 2 that no significant ($p > 0.05$) differences exist in average daily weight gain during pre-weaning (0.22 vs. 0.23 kg) as well as during post- weaning (0.23 vs. 0.25 kg). Thus it seems that weaning at BW3 of their birth weight did not have any adverse effects ($p > 0.05$) on the growth performance of lambs as compared with lambs weaned at four times of their birth weight (BW4). In the current study, according to the plan of the experiment the BW3 lambs reached weaning weight (3 times their birth weight) at 45.13 days, while BW4 lambs reached weaning weight (4 times their birth weight) at 58.86 days, and the differences between them was significant ($p < 0.05$). Also, a significant difference ($p < 0.05$) exist between BW3 and BW4 from weaning to marketing weight being 63.93 and 43.00 days, respectively. However, lambs of BW3 and BW4 at birth reached their marketing weight at 109.07 and 101.86 days, respectively and the differences between them was not significant. Similarly, working on Sannen and Alpine Kids, Gokdal *et al*. (12) reported that kids reached 3 times their birth weight at shorter time in Sannen(42.75) and Alpine (42.21 days) compared with those reached 4 time their birth weight (Sannen 53.15 days and Alpine 65.81 days, respectively).

Table 2. The effect of suckling system and weaning weight on growth rate of lambs (kg).

Trait	No.	Overall Mean	System suckling		Weaning weight*	
			Restricted	Continuous	BW3	BW4
Birth weight	29	4.57±0.14	4.66 ± 0.18a	4.46 ± 0.22a	4.60 ± 0.20a	4.54±0.20a
Weaning weight	29	16.13±0.35	16.21 ± 0.53a	16.05 ± 0.47a	14.49 ± 0.08a	17.89±0.29b
Marketing weight	29	28.95±0.83	29.04 ± 1.12a	28.86 ± 1.29a	29.29 ± 1.13a	28.59±1.27a
Daily gain						
Birth-weaning	29	0.23±0.01	0.23 ± 0.01a	0.22 ± 0.01a	0.22 ± 0.01a	0.23±0.01a
Birth-marketing	29	0.23±0.01	0.23 ± 0.01a	0.23± 0.01a	0.23 ± 0.01a	0.24±0.01a
Weaning-marketing	29	0.24±0.01	0.24 ± 0.01a	0.24 ± 0.01a	0.23 ± 0.01a	0.25±0.01a
No. Days						
Birth-weaning	29	51.76±1.96	49.87 ± 2.52a	53.79 ± 3.04a	45.13 ±2.07b	58.86±2.17a
Birth-marketing	29	105.59±1.89	104.93±2.39a	106.29±3.05a	109.07±2.65a	101.86±2.41a
Weaning-marketing	29	53.83±3.05	55.07 ± 4.03a	52.50 ± 4.74a	63.93 ± 2.89a	43.0±3.80b

Means bearing different letters with each row is differ significantly (p<0.05)
*** BW3= Body weight at birth X3, BW4= Body weight at birth X4;**

CONCLUSION

From the results obtained in the present study, it can be conclude that ewes in restricted suckling yielded significantly higher milk during post-lambing, total and saleable milk as well as longer lactation period as compared with ewes in continuous suckling. Thus restricted suckling system can be applied improve the profitability of native sheep enterprises without causing any adverse effect on growth performance of lambs up to weaning or marketing.

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