

CROSSING LOCAL OSSIMI SHEEP WITH IMPORTED
CHIOS TO IMPROVE MILK PRODUCTION AND
PREWEANING LAMB GAINS
(With 6 Tables)

By

M.T. MOUSA and M.M. SHETAEWI

(Received at 6/1/1994)

**خط أغنام الأوسيمي المحليه بأغنام الكيوس
المستورده لتحسين إنتاج اللبن ونمو
الحملان قبل العظام**

المصطفى موسى ، مسعد شتيوي

أجريت هذه الدراسة فى محطة بحوث ملوى التى تقع على بعد ٣٠٠ كم جنوب القاهرة وقد بلغ عد النعاج المستخدمة ١٦ من الكيوس و ٣١ من الأوسيمي و ٢١ من خليط الجيل الاول بينهم أى ٥٠% كيوس أوسيمي . وقد لقحت النعاج الخليطه بكباش كيوس وأنتجت حملان خليطه (٧٥% كيوس و ٢٥% أوسيمي) بينما لقحت نعاج الأوسيمي و الكيوس بكباش من نفس نوعها . وقد اشتملت الدراسة على النعاج ذات الحملان المفردة فى موسمين للولاده - الصيف والشتاء . كان متوسط إنتاج النعاج من اللبن خلال فترة الرضاعة (٨ أسابيع) فى موسم الصيف ٩ ر ١٢٨ ، ٤ ر ٥٣ ، ١٠ ر ٧٧ كجم فى نعاج الكيوس والأوسيمي والخليط على التوالى ($P < 0.01$) . أما متوسط إنتاج اللبن الكلى فقد بلغ ٦ ر ٢٠١ ، ٢٥ ر ١١٠ كجم وكانت عدد أيام الحليب ١٥١ ر ٦٠ ، ٢٩ ر ١٠٦ فى الأنواع السابقه على التوالى ($P < 0.01$) . أما فى موسم الشتاء فكان متوسط إنتاج اللبن خلال فترة الرضاعة (٨ أسابيع) ٦ ر ١٣٨ و ٥٥ ر ٥٩ كجم فى نعاج الكيوس والأوسيمي و الخليط على التوالى . أما متوسط إنتاج اللبن الكلى فقد بلغ ١ ر ٢٠٩ ($P < 0.01$) ٩ ر ٦٥ ، ٥ ر ٧٦ كجم وكانت عدد أيام الحليب ٣ ر ١٥٣ ، ٨ ر ٧٩ ، ٤ ر ٩٣ على الترتيب ($P < 0.01$) . عند الفطام (عمر شهرين) كانت حملان الكيوس والحملان الخليطه أثقل معنوياً من الحملان الأوسيمي (٥٨ ر ١٢ ، ٨٣ ر ١٢ ، ٤٣ ر ١١ كجم على التوالى) . والخلاصه أنه عند تليقح النعاج الخليطه (كيوس X أوسيمي) بكباش كيوس فان إنتاج اللبن من النعاج ونمو الحملان قد ازداد بالمقارنه بالنعاج الأوسيمي الاصيله وحملانها .

CROSSING LOCAL OSSIMI & IMPORTED CHIOS

SUMMARY

A study was carried out at Mallawi Experiment Station, 300 Km southern Cairo, in which 16 Chios (CC), 31 Ossimi (OO) and 21 of their F₁ crossbred ewes (50% Chios- 50% Ossimi, Co). The CO halfbred ewes were mated to CC rams to produce 75% Ossimi (3/4Cl/40) lambs, whereas OO and CC ewes were mated to rams of their breeds. The study included only ewes having single lambs in two lambing seasons; summer and winter. In the summer, total 8-wk milk yield (suckling period) averaged 128.9, 53.4 and 77.1 Kg in CC, OO and the halfbred ewes, respectively (P<.01). Total milk yield averaged 201.6, 65.0 and 110.2 and days of lactation were 151.1, 79.6 and 106.7, respectively (P<.01). In the winter, total 8-wk milk yield averaged 138.6 (P<.01), 55.0 and 59.5 Kg for CC, OO and the halfbred ewes, respectively. Total yield averaged 209.1 (P<.01), 65.9 Kg and 76.5 Kg and days of lactation were 153.3, 79.8 and 93.4, respectively (P<.01). At weaning (2 mo of age), CC and 3/4Cl/40 lambs weighed significantly heavier than OO lambs; 12.58, 12.83 and 11.43 Kg, respectively. In conclusion, when CO halfbred ewes were mated to CC rams, milk production of the ewes and preweaning gains of their 3/4Cl/40 lambs were increased compared to pure OO ewes and their lambs.

INTRODUCTION

Like most other mammals, a great deal of variation in preweaning lamb growth is associated with variation in milk intake. Therefore, the level of milk production of ewes has been recognized as a trait of major importance. Chios sheep has been classified as a high yielding dairy breed. In Cyprus, Chios ewes produced 240 to 280 Kg of milk in 212 to 220 days. (FAO, 1990). Ossimi, on the other hand, a local Egyptian fat-tailed sheep, is a low yielding breed that produces 50 to 94 Kg of milk (EL-SHERBINIY, 1972; SHETAEWI, 1980 and MOUSA, 1991). In 1984, a flock of Chios sheep was imported from Cyprus by Land Reclamation Organization and kept in a farm near Cairo for 2 yr. The flock was transferred to Mallawi Station by the end of 1986. The objective of this work was to produce F₁ crossbred ewes by crossing the local adapted Ossimi ewes with the imported dairy Chios rams and investigate milk production and lamb performance of this crossbred in relation to the parental purebreds.

MATERIAL and METHODS

This study was carried out at Mallawi Research Station located 300 Km Southern Cairo. Chios sheep were imported from Cyprus in 1984 by Land Reclamation Organization and kept in a farm near Cairo for 2 yr; they were then transferred to Mallawi Experiment Station by the end of 1986. Sixteen Chios (CC), 31 Ossimi (OO) and 21 of their F₁ crosses (1/2CC/20) were utilized in this study. The CO halfbred ewes were produced from mating OO ewes with CC rams. The halfbred ewes were then mated to CC rams to produce 3/4CC/40 lambs, whereas OO and CC ewes were mated to rams of their breeds. The study included two lambing seasons; summer season beginning in May, 1992 and winter season beginning in January, 1993. During each season, all breed groups were subjected to the same management conditions. All ewes were adult (3-5 yr old) and their body weights at mating are shown in Table 1. Milk production of ewes during the 8-wk suckling period was estimated bi-weekly by the "weigh-suckling-weigh" technique and milking the residual milk as described by LOUCA (1972) and LOUCA *et al.* (1974). Lambs were removed from their dams at 1800 on the evening preceding the recording day. Lambs were weighed at 0700 in the morning of the following day and allowed to suckle their dams for 15-min period. Their body weights were then recorded and lambs were removed again until 1800, at which time the procedure was repeated. Following the removal of the lambs the ewes were hand milked. The difference in weight of the lamb before and after suckling represents the amount of milk consumed by the lamb. Milk yield per day was estimated by adding the residual milk of the ewe to the milk suckled by the lamb, at the two suckling periods (i.e. 0700 and 1800). Total 8-wk yield was calculated and recorded. After the 8th wk, lambs were weaned and milk yield was then estimated by hand milking. Hand milking was performed twice daily at 0700 and at 1800. Ewes were considered dry off when the amount of milk produced weighed less than 200 g/d. Total milk yield and length of lactation period (days) were calculated. The study included only ewes having single lambs.

All ewes were grazing on Egyptian clover (*Trifolium alexandrinum*) from December to May. Thereafter, they were fed on crop residues available in summer season (wheat or bean) besides the green maize (darawa). In addition, ewes were supplemented with pelleted concentrate mixture starting with .5 Kg/hd and increased to 1 Kg/hd during late pregnancy and lactation. Mineralized salt blocks were available to all ewes. Ewes were subjected to the routine vaccination program against infectious diseases and also drenched or injected against internal and external parasites.

CROSSING LOCAL OSSIMI & IMPORIED CHIOS

Statistical analysis of data was done according to GILL and HAFS (1971) and STEEL AND torrie (1980) using the general linear model (GLM) procedures of SAS (1987) for personal computers.

RESULTS

Body weight of Chios, Ossimi and their crossbred ewes at mating is shown in Table 1. Body weight of Ossimi ewes in the summer season was heavier ($P < .01$) than the halfbred and tended to be heavier than the Chios. In the winter, Ossimi ewes weighed heavier ($P < .01$) than either the Chios or the halfbred ewes.

Daily milk production during the winter and the summer lambing seasons is presented in Table 2. Total milk production during the 8-wk suckling period and during the whole lactation period for the summer and the winter lambing seasons are presented, respectively, in Tables 3 and 4. Body weight of different genotypes of lambs at birth, 1mo and 2 mo of age is presented in Table 5 and average daily gain is shown in Table 6

DISCUSSION

Milk yield of the Ossimi and the halfbred ewes declined progressively from wk 2 until wk 8 of lactation, whereas that of the chios ewes peaked at wk 4 and started to decline thereafter (table 2). this observation was noted in both the summer and the winter lambing seasons. Chios ewes was superior in milk production ($P < .01$) in both seasons than either the Ossimi or the halfbred ewes, which is expected from a dairy breed. The halfbred ewes consistently exceeded ($P < .05$) the Ossimi ewes through all weeks of lactation in the summer season. But in the winter milk production of the Ossimi ewes was nearly similar to that of the halfbred ewes. MOUSA (1991) found that the shape of lactation curve differed between the Chios and both Ossimi and Awassi breeds in that the peak was higher in Chios and persisted longer than either of Ossimi or Awassi.

Considering total milk production during the 8-wk suckling period and during the whole lactation period, all the three breed groups have different means ($P < .05$) in the summer lambing season, with the Chios being the highest and Ossimi the lowest, whereas the halfbred was intermediate (Table 3). In the winter, the chios ewes produced the greatest amount of milk (Table 4), where.s the Osssimi and the halfbred produced similarly, eventhough the halfbred ewes tended to have higher means. Shetaewi (1980) found that Ossimi ewes nursing singles produced 50.7 kg, whereas those nursing twins produced 81.7 kg in 84 days. ABOUL-NAGA et al. (1981) found that Ossimi ewes produced

65.5 kg in 84 days of lactation. More recently, MOUSA (1991) found that total milk production was 58.1, 72.5 and 143.2 kg and lactation periods were 81, 93 and 142 days in Ossimi, Awassi and Chios ewes, respectively. These values were lower than those obtained in the present study probably because of differences in nutrition and management conditions. *ELSHERBINY et al.* (1972), however, recorded a higher estimate for milk production (94.3 kg) in pure Ossimi ewes during a 18 wk lactation period. They found that the 1st cross between Merino (107.5 kg milk) and Ossimi (94.3 kg) showed a hybrid vigour and produced greater (158.35 kg) than the pure breeds. In the present study, milk production of the halfbred ewes was intermediate between the Ossimi and the Chios purebreds (Tables 3 & 4). The halfbredewes gave about 84% and 58% of the average milk yield of the parental purebreds in the summer and the winter lambing seasons, respectively. The basic theory of crossing is based generally on the facts that when animals are crossed, provided that they differ genetically as in races, species or genera, then a phenomenon called heterosis occurs. It is called positive heterosis if the offspring are better than the average of both parents, and negative heterosis if the offspring are worse than the average of both parents (*DALTON, 1981*). In the present study, negative heterosis was expressed in the cross. However, milk production was increased by 57% and 12% in the summer and the winter lambing seasons, respectively when comparing the f₁ crossbred ewes with the local strain (Ossimi). In theory, *MASON and BUVANENDRAN (1982)* indicated that heterosis is expected to be greater for those characters which are related to fitness and is expected to be higher also in a stressful environment. Egypt is, however, not strictly a tropical environment and the management conditions in most of the experiments are favorable. Performance of the exotic Chios breed, on the basis of milk yield, which was fairly high, illustrates this fact. *MASON and BUVANENDRAN (1982)* reported that in a favorable environment the improved breed will yield nearer to its genetic potential. The present results suggest that the improvement in yield in the CO crossbred was due to the additive effect of genes.

Results also showed that more than 60% of the total milk yield is produced during the 1st 8 wk of lactation in all breeds studied (Tables 3 & 4). Moreover, the Ossimi ewes produced significantly greater proportion (83%) of its total milk yield during that period compared to the Chios (65%) or the halfbred (75%) ewes. These differences are attributed to differences in the length of lactation periods between these breeds. The shorter the lactation period (in Ossimi), the

CROSSING LOCAL OSSIMI & IMPORIED CHIOS

greater the proportion of milk that is produced during the 1st 8 wk and vice versa. These results almost agree with MOUSA (1991) who suggested that Ossimi lambs, unlike Chios or Awassi, should be weaned at 2 mo of age because mothers' milk is very limited after that period.

Birth weight did not differ ($P > .05$) between breeds (Table 5). However, Ossimi lambs had the highest birth weight mean and chios had the lowest, whereas 3/4C1/40 lambs were intermediate ($P > .05$). The low birth weight of the Chios lambs in the present study could be due to the effect of environment, because Chios lambs in Cyprus normally weigh heavier (4 kg) at birth MAVROGENIS *et al.*, 1980). At 1 mo the Chios lambs tended to be heavier than the Ossimi ($P < .08$) and were similar to the 3/4C1/40 lambs. At 2 mo of age, the Chios and the 3/4C1.40 lambs weighed significantly heavier than the Ossimi lambs. Obviously, differences in body weights of lambs that occurred gradually after birth and reached a significant level at 2 mo of age, could be attributed to corresponding differences in average daily gain (ADG) between these breeds (Table 6). During the 1st mo of age, ADG was significantly greater in the Chios than in the Ossimi and the 3/4C1/40 lambs. During the 2nd mo, the 3/4C1/40 lambs exceeded either of the purebred lambs. But the overall ADG was almost similar in the Chios and the 3/4C1/40 lambs; both of them had higher means than the Ossimi lambs (Table 6). These differences in ADG between different genotypes of lambs are related to differences in milk production of ewes besides differences in conversion efficiency between lambs. In the Chios, a significant correlation ($r = .52$, $n = 16$, $P < .05$) was found between total 8-wk milk yield and lamb gain during that period. In the Ossimi, the correlation was low and not significant ($r = .21$, $n = 29$, $P > .10$) and in the crossbred the correlation was slightly higher than that of Ossimi ($r = .25$, $n = 20$, $P > .10$). Higher estimates of correlation coefficients between kilograms of lambs weaned per ewe and milk yield were obtained by ELSHERBINY *et al.* (1972) in Ossimi sheep and between body weight of lambs at 8 wk of age and the amount of milk consumed (EL-HOMMOSI and ABD EL-HAFIZ, 1976) in Ossimi, too.

In conclusion, when Chios-Ossimi halfbred ewes were mated to chios rams, milk production of the halfbred ewes and preweaning gains of their 3/4C1/40 lambs were increased compared to pure Ossimi ewes and their lambs. The halfbred ewes produced less milk than the Chios, but weaned the same weight of lambs per ewe.

REFERENCES

- Aboul-Naga, A.M.; El-Shobokshy, A.S.; Marie, I.F. and Moustafa, M.A. (1981): Milk production from subtropical non-dairy sheep. 1-Ewe performance. *J. Agr. Sci. Camb.* 97: 297-301.
- Dalton, C.D. (1981): An Introduction to Practical Animal Breeding. ELBS (1st ED.) Granada publishing Limited. London.
- El-Hommosi, F.F. and Abd El-Hafiz, G.E. (1976): Some environmental factors affecting per-weaning weights of Ossimi and Saidi lambs. *Assiut J. Agr. Sci.* 7: (3) 187-201.
- Elsherbiny, A.A.; Shesha, A. and Farid, A. (1972): Effect of crossing Ossimi sheep with Merino on milk production and mothering quality. *Agric. Res. Review* 50:37-43.
- FAO (1990): Animal production and Health Paper 55, Small Ruminants in the Near East, Part 2, pp. 35-44. The Chios sheep in Cyprus. (In Arabic) Rome, Italy.
- Gill, J.L. and Hafs, H.D. (1971): Aanalysis of repeated measurements of animals. *J. Anim. Sci.* 33: 331-336.
- Louca, A. (1972): The effect of suckling regime on growth rate and lactation performance on the Cyprus fat-tailed and Chios sheep. *Anim. Prod.* 15: 53-59.
- Louca, A.; Mavrogenis, A. and Lawlor, M.J. (1974): Effects of plan of nutrition in late pregnancy on lamb birth weight and milk yield in early lactation of Chios and Awassi sheep. *Anim. prod.* 19: 341-349.
- Mason, I.L. and Buvanendran V. (1982): Breeding plans for ruminant livestock in the tropics. Animal Production and Health. Paper 34. FAO. Rome, Italy.
- Mavrogenis, A.P.; Louca, A. and Robison, O. W. (1980): Estimates of genetic parameters for pre-weaning and post-weaning growth traits of Chios lambs. *Anim. prod.* 30: 271-276.
- Mousa, M.T. (1991): Effect of crossing chios with Ossimi, Awassi and their crosses on some productive traits. Ph. D. Thesis. Assiut Univ., Assiut, Egypt.
- SAS (1987): SAS/STAT Guide for Personal Computers (Version 6 Ed). SAS Inst., Cary, N.C.
- Shetaewi, M.M. (1980): The effect of nutritional plane on skin follicle development and wool production in Ossimi and Saidi sheep. M.S. Thesis. Assiut Univ., Assiut, Egypt.
- Steel, R.G.D. and Torrie, J.H. (1980): Principles and Procedures of Statistics: A Biometrical Approach (2nd Ed). McGraw-Hill Book Co., New York.

Table 1. Body weight (kg) at mating of Chios (CC), Ossimi (OO) and their crossbred (CO) ewes^{a,b}

Breed	Summer	Winter
Chios (CC)	41.6 ± 1.2 ^{cd} (8)	41.0 ± 1.2 ^c (8)
Ossimi	44.1 ± 0.9 ^c (15)	47.1 ± 0.9 ^d (16)
Halfbred (CO)	38.8 ± 1.0 ^d (12)	43.9 ± 1.2 ^c (9)

^a values are least-squares means ± standard errors; number of ewes are shown in parenthesis.

^b Means in the same column not having a common superscript differ (P<.01).

Table 2. Daily milk production (kg/day) of Chios, Ossimi, and their crossbred ewes suckling single lambs during the suckling periods of the summer and the winter lambing seasons^{a, b}

Week	Summer ^d			Winter ^c		
	Chios (8)	Ossimi (15)	Halfbred (12)	Chios (8)	Ossimi (16)	Halfbred (9)
2	2.47 ± .14	1.29 ± .10	1.85 ± .11	2.72 ± .14	1.31 ± .10	1.39 ± .13
4	3.06 ± .13	1.12 ± .09	1.62 ± .11	3.17 ± .15	1.12 ± .11	1.19 ± .15
6	2.36 ± .09	0.96 ± .07	1.35 ± .08	2.57 ± .12	0.93 ± .08	1.07 ± .11
8	1.85 ± .08	0.72 ± .06	1.09 ± .07	2.03 ± .08	0.85 ± .05	0.89 ± .07

^aValues are least-squares means ± standard error; number of ewes are shown in parenthesis.

^bAn interaction between breed group and season was noted ($P < .01$).

^cMeans for Ossimi and the halfbred did not differ ($P > .05$), both of them had consistently lower ($P < .01$) means than Chios ewes.

^dAll the three breed groups had different means through weeks of lactation ($P < .01$).

CROSSING LOCAL OSSIMI & IMPORIED CHIOS

Table 3. Total milk production during the suckling period (8 wk) and during the whole lactation period for the summer lambing season^{a,b}

	Chios (8)	Ossimi (15)	Halfbred (12)
8-wk yield	128.9 ± 4.5 ^c	53.4 ± 3.3 ^d	77.1 ± 3.6 ^e
Total yield	201.6 ± 5.1 ^c	65.0 ± 3.7 ^d	110.2 ± 4.1 ^e
8-wk/total	0.64 ± .02 ^c	0.82 ± .02 ^d	0.71 ± .02 ^e
Days of lactation	151.1 ± 5.2 ^c	79.6 ± 3.8 ^d	106.7 ± 4.2 ^e

^aValues are least-squares means ± standard error; number of ewes are shown in parenthesis.

^bMeans in the same row not having a common superscript differ (P<.01).

Table 4. Total milk production during the suckling period (8 wk) and during the whole lactation period for the winter lambing season^{a,b}

	Chios (8)	Ossimi (16)	Halfbred (9)
8-wk yield	138.6 ± 5.2 ^c	55.0 ± 3.7 ^d	59.5 ± 4.9 ^d
Total yield	209.1 ± 5.9 ^c	65.9 ± 4.2 ^d	76.5 ± 5.6 ^d
8-wk/total	0.66 ± .02 ^c	0.83 ± .01 ^d	0.78 ± .02 ^e
Days of lactation	153.3 ± 4.2 ^c	79.8 ± 3.0 ^d	93.4 ± 4.0 ^e

^aValues are least-squares means ± standard error.

^bMeans in the same row not having a common superscript differ (P<.01).

MOUSA & SHETAEWI

Table 5. Body weight of single lambs (kg) at birth, 1 mo and 2 mo of age for Chios (CC), Ossimi (OO) and 3/4Cl/40 breed groups of lambs^{a, b}

Age	Sex	Chios (CC)	Ossimi (OO)	3/4Cl/40
Birth	male	3.55 ± .27 (10)	4.65 ± .27 (11)	3.97 ± .26 (11)
	female	3.65 ± .35 (6)	3.69 ± .19 (20)	3.90 ± .28 (10)
avg.		3.60 ± .22	4.17 ± .17	3.94 ± .19
1 Mo	male	9.41 ± .44 (10)	8.71 ± .48 (10)	9.06 ± .42 (11)
	female	10.08 ± .57 (6)	9.13 ± .31 (20)	9.75 ± .46 (9)
avg.		9.75 ± .36	8.92 ± .29	9.41 ± .31
2 Mo	male	12.15 ± .57 (10)	11.30 ± .62 (10)	12.57 ± .55 (11)
	female	13.00 ± .74 (6)	11.57 ± .41 (20)	13.09 ± .60 (9)
avg.		12.58 ± .47 ^d	11.43 ± .37 ^c	12.83 ± .41 ^d

^aValues are least-squares means ± standard error; number of lambs are shown in parenthesis.

^bMeans in the same row not having a common superscript differ (P<.05).

Table 6. Average daily gain (ADG) for Chios (CC), Ossimi (OO) and 3/4Cl/40 breed groups of lambs^{a, b}

ADG (g)	Chios (CC)	Ossimi (OO)	3/4Cl/40
Birth to 1 mo	203 ± 6 ^c	181 ± 4 ^d	186 ± 5 ^d
1 mo to 2 mo	94 ± 6 ^c	86 ± 4 ^c	114 ± 5 ^d
Birth to 2 mo	148 ± 4 ^c	133 ± 3 ^d	150 ± 3 ^c

^aValues are least-squares means ± standard error.

^bMeans in the same row not having a common superscript differ (P<.05).