

## Effects of Milk Replacer on Kid Growth and Farm Profitability in the Shami Goat

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**Abstract:** This experiment was conducted to compare the kid growth and doe milk production under kid suckling and milk replacer (MR) regimes. Thirty does with single kids were randomly assigned into two equal groups (15 kids per group): the control group, where kids suckled freely, and the MR group, where kids were fed with MR containing 21% fat and 22% protein. Kids were weighed at birth, at 15, 30, and 45 days of age and at weaning at the age of 60 days. The growth rate of kids, and the 60-day and lactation milk yield of dams were not statistically affected by the kid rearing systems. However, kid rearing on MR increased farm profitability on the basis of milk price and the body weight of kids. According to the results, MR for kid rearing can be profitably used in Shami goat raising without any negative effects on kid growth.

**Key Words:** Shami goats, kid rearing, milk replacer

### Şam Keçilerinde Süt İkâme Yemlerinin Oğlak Gelişimi ve Çiftlik Kârlılığı Üzerine Etkileri

**Özet:** Bu çalışma, emiştirme veya süt ikâme yemleri ile büyütülen oğlaklarda, oğlak gelişimi ve anaların süt verimlerini karşılaştırmak amacı ile yapılmıştır. Çalışmada 30 baş, tekiz doğuran analar oğlakları ile birlikte rastgele iki eşit gruba ayrılmıştır (her grupta 15 baş oğlak). Bu gruplar; oğlakların serbest olarak emdiği kontrol grubu ve % 21 yağ, % 22 protein içeren süt ikâme yemi ile beslendiği süt ikâme yemi grubudur. Oğlaklar doğumda, 15., 30., 45. günlerde ve 60 günlük yaşta uygulanan süttten kesimde tartılmışlardır. Çalışma neticesinde, oğlakların gelişimi, anaların 60 günlük ve laktasyon süt verimleri oğlak büyütme sistemlerinden istatistiksel olarak etkilenmemiştir. Bununla birlikte, süt ikâme yemi ile büyütme, süt fiyatı ve oğlak gelişimi dikkate alındığında işletme kârlılığını artırmıştır. Elde edilen bu sonuçlara göre, Şam keçisi yetiştiriciliğinde süt ikâme yemleri ile oğlak büyütmenin oğlakların gelişimlerini olumsuz etkilemeksizin, kârlı bir şekilde uygulanabileceği söylenebilir.

**Anahtar Sözcükler:** Şam keçisi, oğlak büyütme, süt ikâme yemi

### Introduction

Turkey is an important goat raising country with a goat population of 8,951,000 (1). For this reason, goat raising has an important place in the economy of Turkey, especially for people living in mountainous regions. In addition, goats are able to convert otherwise unusable vegetation on poor grazing land to meat, milk, fibre and skins (2).

In Turkey, the major income of goat keepers comes from milk yield (3,4). Under extensive production systems kids are reared by nursing for 60-75 days after birth and the does are not milked during this period. Housing kids together with their dams during this period decreases the income from milk sales (5-7). Different kid rearing systems can be applied in order to provide the

maximum marketable milk yield during the suckling period and thus to increase farm profitability. Kid rearing with milk replacer (MR) is one of these systems and plays an important role, especially for large flocks.

Although there are many reports on the utilisation of milk and MR for lambs and calves, there is limited information on young goats. Thus, the purpose of the present experiment was to compare the effects of MR versus suckling on kid growth and farm profitability in Shami (Damascus) goats, known for their high milk yield and large litter size (6,8,9).

### Materials and Methods

This study was carried out with Shami (Damascus) goats kept at the Research and Training Farm of Mustafa

Kemal University, in the Antakya province of Turkey. Antakya is located at latitude 36° north and longitude 36° east on the Syrian border in the eastern Mediterranean region, where climatic conditions are hot and dry in summer, and warm and rainy in winter.

The animal material of the experiment was 30 Shami (Damascus) goats at the age of 5 years with their 30 single kids that were born in the 2001 kidding season. The experimental goats were grazed on pasture and fed on 1 kg concentrate per day (16% crude protein and 2500 kcal ME/kg). All kids were fed the same amount of diet containing 2400 kcal ME and 21% crude protein per kg. The daily amount of concentrate per kid was 70 g at the 3<sup>rd</sup> week, 100 g at the 4<sup>th</sup> and 5<sup>th</sup> weeks, 150 g at the 6<sup>th</sup> week and 250 g from the 7<sup>th</sup> week to weaning. In addition, the daily amount of alfalfa hay per kid was 50 g at the 3<sup>rd</sup> and 4<sup>th</sup> weeks, and 100 g from the 5<sup>th</sup> week to weaning. Kids were randomly assigned into control and milk replacer (MR) groups (15 kids in each group). In order to eliminate the effect of sex on kid growth performance, all measurements were standardised to the female basis. A mathematical model of the experiment is shown in equation 1.

$$Y_{ij} = \mu + \alpha_i + e_{ij} \dots\dots\dots 1$$

$Y_{ij}$ , recorded value of the  $j^{\text{th}}$ . animal in the  $i^{\text{th}}$ . treatment group

$\mu$ , mean of population

$\alpha_i$ , effect of treatment group,  $i = 1, 2$   
 $e_{ij}$ , error term

The kids in the control group were kept with their mothers until weaning and allowed to suckle their dams. The MR group was fed colostrum *ad libitum* for 2 days, and then the kids were separated from their mothers and given the MR until 60 days old. The daily consumption amount and the composition of the MR are given in Table 1 (10). The solid in the liquid diet was 16.67% as recommended by the producer (10).

Both groups were given equal amounts of concentrate, alfalfa hay and water after 14 days old. Body weight was recorded every 15 days from birth to weaning. Machine milking was used and the milk yields of does were measured and calculated at 28-day intervals during the 240 days of the lactation period according to the A4 method of ICAR (11). Experimental data was analysed using ANOVA in SPSS (12).

**Results**

The effects of MR on the growth performance of kids until weaning and the milk yield of dams during this period are presented in Table 2. The body weights of the kids and the milk yields of the does (control, 3.5 ± 0.10 kg vs MR, 3.7 ± 0.09 kg) of the two groups were not statistically different ( $p > 0.05$ ). The daily gains of the kids were calculated and found to be statistically similar during the experimental period. At the end of the experiment, the weaning weights in the control and MR groups were 9.2 ± 0.61 kg and 10.4 ± 0.54 kg, respectively. The live weights of kids were statistically insignificant between the groups at each weighing day ( $p > 0.05$ ). The rearing system also had no statistically significant effect on the milk yield of dams ( $p > 0.05$ ) during the first 60 days of lactation and throughout lactation. In the present experiment, the 60 day and lactation milk yields (240 days) of goats were estimated in the control group to be 82.1 ± 4.68 l and 319.7 ± 7.41 l, and in the MR group to be 76.9 ± 3.39 l and 321.3 ± 13.63 l, respectively.

Determining a more profitable kid rearing system was the other goal of this study. The control group was given values of 0 in the economic analysis of the rearing systems. The economic comparison of the two systems is presented in Table 3. Rearing of kids on MR increased

Table 1. The content of milk replacer (Goatlac W®) and suggested daily intake of liquid diet (10)

Standard Chemical Analysis		Age	Amount
Fat	21%	1 <sup>st</sup> day	Colostrum
Protein	22%	2 <sup>nd</sup> day	Colostrum
Fibre	0.2%	3 <sup>rd</sup> day	0.6 l/day
Ash	9%	4 <sup>th</sup> day	0.7 l/day
Calcium	0.9%	5 <sup>th</sup> day	0.8 l/day
Phosphorus	0.7%	6 <sup>th</sup> day	0.9 l/day
Added Vitamins per Kg		7 <sup>th</sup> day	1.0 l/day
Vitamin A	50,000 i.u.	2 <sup>nd</sup> week	1.15 l/day
Vitamin D3	10,000 i.u.	3 <sup>rd</sup> week	1.25 l/day
Vitamin E	60 i.u.	4 <sup>th</sup> week	1.25 l/day
Vitamin C	60 mg	5 <sup>th</sup> week	1.50 l/day
Vitamin B1	15 mg	6 <sup>th</sup> week	1.50 l/day
Vitamin B6	3 mg	7 <sup>th</sup> week	1.50 l/day
Vitamin B12	40 mg	8 <sup>th</sup> week	1.50 l/day
Selenium	0.15 mg	56-60 <sup>th</sup> days	1.50 l/day
Nicotinic acid	100 mg		
Panthenic acid	15 mg	Total	77.55 l

Table 2. Means  $\pm$  s.e. of weights of kids and doe milk production in the two different kid rearing systems

Traits/ Groups	Birth weight (kg)	15 <sup>th</sup> day weight (kg)	30 <sup>th</sup> day weight (kg)	45 <sup>th</sup> day weight (kg)	60 <sup>th</sup> day weight (kg)	milk yield in 60 days (l)	Lactation milk yield (l)
Control	3.5 $\pm$ 0.10	4.4 $\pm$ 0.20	6.8 $\pm$ 0.29	7.8 $\pm$ 0.48	9.2 $\pm$ 0.61	82.1 $\pm$ 4.68	319.7 $\pm$ 7.41
MR	3.7 $\pm$ 0.09	4.6 $\pm$ 0.27	6.5 $\pm$ 0.38	8.3 $\pm$ 0.45	10.4 $\pm$ 0.54	76.9 $\pm$ 3.39	321.3 $\pm$ 13.63
Total	3.6 $\pm$ 0.07	4.5 $\pm$ 0.17	6.7 $\pm$ 0.23	8.0 $\pm$ 0.32	9.8 $\pm$ 0.42	79.5 $\pm$ 2.87	320.5 $\pm$ 7.63
Sign.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

MR, milk replacer group; N.S., non-significant

Traits	Control	MR
Marketable milk yield in suckling period (l/doe)	0	79.50
Live weight gain (kg/kid)	0	1.00
Milk replacer powder (kg/kid)	0	12.93
Income from milk (USD/doe) <sup>1</sup>	0	30.61
Income from live weight (USD/kid) <sup>2</sup>	0	1.50
Cost of milk replacer (USD/kid) <sup>3</sup>	0	-20.69
Cost of milking (USD/kg) <sup>4</sup>	0	-1.59
Cost of milk replacer preparation (USD/kid) <sup>5</sup>	0	-1.74
Profit per doe (USD)	0	8.09

Table 3. Economic analysis of two different kid rearing systems in Turkey (January, 2002)

<sup>1</sup>price of goat milk, 0.385 USD/l; <sup>2</sup>price of live weight of kid, 1.5 USD/kg; <sup>3</sup>price of milk replacer, 1.6 USD/kg; <sup>4</sup>cost of milking, 0.02 USD/l; <sup>5</sup>cost of preparing of milk replacer, 0.135 USD/kg milk replacer; MR: milk replacer group

marketable milk yield (79.5 l per goat) compared to the control group during the experimental period. In addition, kids in the MR group gained 1 kg/ kid extra live weight and consumed 12.93 kg MR in powder per kid. Economic analysis of the kid rearing systems showed that kid rearing on MR earned 8.09 USD more profit than the 60 day suckling system.

## Discussion

In the present study, kids were kept in two different rearing systems. Growth performance in the two groups was not statistically different during the suckling period. At weaning, the average live weight in the MR group was 1 kg/kid higher than that in the suckling group ( $p > 0.05$ ). This agrees with reports of some researchers (13,14), who reported that the growth performance of kids reared with goat milk or MR did not differ significantly from each other. In addition, a similar weaning weight for Damascus kids has been reported (15). Dams in the control group produced statistically insignificantly more milk during the first 60 days of lactation and throughout lactation compared with the MR

group. Raising the kids with their dams had no effect on lactation performance due to the minimal importance of the neuroendocrine milk ejection reflex in goats compared with that of other ruminants (16). Nevertheless, it was stated that keeping kids with their dams during milking increases milk release (7). Therefore, the higher milk yield ( $p > 0.05$ ) in the control group in the present study can be explained by the latter report. The milk yield estimated for 60 days in this study was similar to that stated by Economides et al. (8), who found 75-78 kg for Damascus goats.

Economic analysis of this study shows that kid rearing on MR can provide 8.09 USD/goat more profit than suckling. This may be because of MR powder being cheaper than goat's milk.

The lactation curve of goats increases during the 2 months after birth and reaches a peak similar to sheep and cattle. Therefore, the less milk is suckled until weaning the more profitability can be obtained. This study shows that providing MR instead of goat milk in kid rearing for Shami (Damascus) goats increases the marketable milk yield and farm profitability without any

negative effects on kid growth. It is concluded that goat milk and MR prices should be compared before deciding which kid rearing system is to be used. According to the price a more profitable system should be preferred.

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