Improving Newborn Lamb Survival and Growth Rates in Semi-intensive Conditions in Northern Cyprus

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Abstract

In this paper, implement strategies to mitigate loss of newborn with the overall goal of improving production efficiency will be discussed. The aim of this study was to determine newborn lambs' survival and growth rates in semi-intensive farm conditions in a private farm in Kyrenia -Northern part of Cyprus. Totally 320 dairy indigenous ewes (160 heads Awassi and 160 heads Chios x Awassi crossbreds) were investigated during 2020-2021 production season. Animals were split into two groups as experimental and control groups and housed in semi-open barns. Ewes were mated natural methods as ram effects in May. Then, 2nd months of pregnancy, ultrasound test was performed. After the lambs were born, umbilical cord care was performed, and birth protocol was applied. The lambs were housed in a closed lamb rearing unit under intensive conditions. For experimental groups of each genotype, 2.5 cc. feed additive (Makrovit Portacure diakes productTM) was given orally from birth to 5th days after birth and 3 days after weaning to strengthen the intestinal flora, to meet their electrolyte and vitamin needs, and to strengthen their immune system.

At the end of the study, it was observed that the fertility and prolificacy rate of pure Awassi were lower than Chios x Awassi crossbred ewes in both control and experimental groups. The mortality rate of control groups of each breed was higher than experimental groups within first 30 days after birth ($p<0,01$). There were no lamb loses after 30 days and in the post-weaning period. Our results showed that the using feed additive in critical periods of newborn lamb's rumen microorganisms, decrease mortality rate, improve immunity and leads to a better performance.

Keywords

Lamb survival, Awassi, Chios, crossbred, feed additives, newborn periods

1. Introduction

Lamb production is an important source of income for sheep farmers and at the same time, the future of farms is the strategic production of countries against imports. All kinds of animal production such as milk, meat which have economic value in livestock, occur depending on the fertility. The sustainability of animal production depends on the survival of the newborn as well as the yields. For this reason, newborn losses should be kept to a minimum. The economic success of sheep-goat farms largely depends on increasing the number of offspring per animal at weaning and reducing production costs (Ünal et al., 2018). Lamb losses vary depending on the care, feeding and conditions provided at many stages of production. The care, feeding, shelter and mating practices applied in the enterprises significantly affect the number and genetic structure of the animal in the herd. Feed cost is at a high level with 60-80% in business inputs. However, lamb losses cause 15%-30% income loss. This issue has been covered in the past by Watson (1957); Haughey (1983); and Alexander (1984) focused on the improvement of sheep breeding efficiency and significant progress was made. However, later studies focusing on the survival of lambs Walker et al. (2002), Kleemann and Walker (2005a), and Croker and

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Harper (2006) gained priority. Lamb losses generally occur within the first ten days after birth (Holmøy and Waage, 2015) of which occurs between 4-21% (Ipsen, 2013) depending on hereditary and environmental factors. It is possible to say that the loss of offspring occurs due to prenatal, hereditary and maternal effects. Alexander and Peterson (1961) report that 88% of deaths occur in the first three days, while Johnston (1980) reports that perinatal deaths are 77.8%. In Turkey, Lamb losses vary between 9.50-14.43% (Ünal et al., 2018) depending on the genotype and production system. In today's conditions, as the control of the way of breeding has shifted to conditions, care, feeding and managerial practices have gained weight rather than genetic factors. Prenatal preparation, birth and immediate postnatal practices cause significant differences in offspring losses. Breeders now have to produce in a more competitive environment. For this reason, the number of offspring obtained per year becomes even more important.

Many farmers frequently asked how they could increase survival rate of newborn lambs. It is estimated that every year 5 million newborn farm animals are dying in Turkey. It is not easy to answer this question as it depends on many factors including lambing rate, management and feeding practices and production system. It is possible to reduce newborn losses with prevention strategies of improve management and nutrition system while others are harder to address. Once patterns are identified, it is possible to target those that have the greatest potential to effect.

In this paper, implement strategies to mitigate loss of newborn with the overall goal of improving production efficiency will be discussed.

2. Material and Methods

Totally 320 dairy sheep (160 Awassi, 160 ChiosxAwassi CROSSBREDS) and their off-springs were determined in private semi-intensive farm in Northern Cyprus during 2020-2021 production season. Sheep were reared in semi-open barns and fed in May by flushing (concentrate feed containing 18-19% HP, 2500 Kcal/kg ME + good quality hay + grazing on medium quality pasture for 4 hours a day) and mated by using ram effect method (20:1; ewe/ram ratio). Fresh and clean water was freely supplied to the animals in both groups.

At the 2 months of gestation ultrasonic pregnancy test was performed to all experimental animals. After the lambs were born, umbilical cord care was performed, and birth protocol was applied. The lambs were housed in an intensive lamb rearing unit under intensive conditions. Experimental group lambs were oral fed by 2.5 cc. feed additive (Makrovitt Portacure diakes product^{TM}) two different periods in early stage of their life as; every day from birth to 5 days after birth and 3 days after weaning. The additive was dissolved in boiled and cooled water at 37ºC and given orally with sterile injectors directly to the lambs. This feed additive was used to strengthen the intestinal flora of ruminants, to meet their electrolyte and vitamin needs, and to strengthen their immune system. The content of the product used is given below.

Table 1
Content of Makrovit Portacure Diakes™ product used in the study

Active Substance	Substance name	Level in Premix	Unit
Immune Boosters			
MOSS	Moss Beta Glukan+Oligosaccarit	30,000	mg/kg
Egg İmmunglobulini IgY	Egg products	12,500	mg/kg
Mannan	Saccharomyeces Cerevisia Cell Wall Ext.	10,800	mg/kg
Glucan	Saccharomyeces Cerevisia Cell Wall Ext.	13,200	mg/kg
Probiotics			
Enterecoccus Faceum	Enterecoccus Faceum Ncimb 104 15	$9x10^{10}$	CFU/kg
Maya	Saccharomyces Boulardi	$9x10^{10}$	CFU/kg
Amino Acids			
Glisin	Glisin Monohidrat	5,000	mg/kg
Carbohydrates			
Lactoz Monohydrat	B-D Galactopyranosyi-D-Glucose	298,720	mg/kg
Protectors			
Citric Acit Anhdri	Citric Acit Anhydri	48,730	mg/kg
Electrolytes			
Klor	Sodium chloride	85,500	mg/kg
Potassium	Potassium chloride	20,300	mg/kg
Sodium (Na)	Sodium bicarbonate ($NaHCO_3$)	67,300	mg/kg
Vitamins			
Vitamin A	Retinol Acetate	2,000,000	IU/kg
Vitamin C	Ascorbic Acid	7,000	mg/kg
Vitamin K	Synthetic Menadione	7,000	mg/kg
Vitamin D3	Cholecalciferol	400,000	IU/kg
Vitamin E	Alpha Tocopherol Acetate	2,000	mg/kg
Vitamin B1	Thiamine	1,000	mg/kg
Vitamin B2	Ribofavin	1,250	mg/kg
Vitamin B6	Pyridoxine	1,000	mg/kg
Vitamin B12	Syanocobalamin	10	mg/kg
Carrier			
Yeast	Dry yeast (Cell Wall Ext..)	qsp	
Dextrose	Dextrose Monohidrat		

The lambs were raised from birth to weaning according to the protocol developed by us (Table 2)

Table 2
Lamb rearing protocol developed by us

Days	Experimental groups	Control groups
1-3	1 cc Vitamin E selenium+ colostrum+ 1 cc B complex vitamin + Diakes 2.5 cc	1 cc Vitamin E selenium+ colostrum+ 1 cc B complex vitamin
3-5	Mother Milk + Diakes 2.5 cc	Mother Milk
5-14	Mother Milk	Mother Milk
14 -21	Lamb starter	Lamb starter
21-30	Lamb starter +good quality straw separated from the mother during the daytime and the mothers are taken to single milking	Lamb starter +good quality straw separated from the mother during the daytime and the mothers are taken to single milking
30-45	The lambs are separated from the mother and kept with their mothers for 3 hours after evening milking.	The lambs are separated from the mother and kept with their mothers for 3 hours after evening milking.
45	2.5 cc diakes are given to weaning lambs for 3 days	Weaning

When the lambs were 14 days old, they separated from their mothers between 8.00 in the morning and 16.00 in the afternoon, and the mothers were milked by automatic milking machine in the afternoon. Enterotoxemia vaccines were made on the 20th day and then lamb starter feed (%16 HP, 2300 Kcal/kg ME) was started. On the 21st day, quality dry grass was chopped freely in 2-cm size and given as straw. On the 30th day, the lambs were completely separated from their mothers and kept with their mothers for 3 hours after milking in the afternoon. Mothers were milked twice a day. On the 40th day, the 2nd booster enterotoxemia vaccines were made and lambs were weaned on the 45th day. In this period, 2.5 cc diakes application was applied orally to the trial lambs for 3 days. During the experiment, the number of mating sheep, pregnant ewes, bred ewes, number of lambs born, birth weight, first 3 days, 14th day, 30th day 456th day and after weaning were determined.

The obtained findings were compared with the statistical program SPSS (21) and the comparison of the groups was determined by the t-test method.

3. Results and Conclusions

Values related to reproductive parameters of Awassi and crossbred of Chios x Awassi ewes were given in Table 3. The treatment effects on the number of pregnant ewes, birthing ewe, lambs' number, birth live weight of lambs (kg), the fertility rate (%), and prolificacy (%) of experimental groups are not significant. Bu the mortality rate of the groups during 0-14 and 0-30 days of the groups is statistically significant ($P<0.01$). The reproductive parameters of experimental groups of ewes and off springs were given in Table 3.

Table 3
Reproductive parameters of experimental groups

Traits	Awassi			Chios x Awassi		
	Control	Treatment	f	Control	Treatment	f
Number of mated ewes	80	80	NS	80	80	NS
Number of pregnant ewe	78	79	NS	77	78	NS
Number of birthing ewe	78	79	NS	77	78	NS
Number of lamb	83	86	NS	132	138	NS
Birth live weight (kg)	4.8±0.5	4.6±0.2	NS	2.1±0.1	1.9±0.3	NS
Fertility rate (%)	1.03	1.07	NS	1.65	1.73	NS
Prolificacy (%)	1.06	1.08	NS	1.71	1.76	NS
Mortality rate (0-14 days) (%)	5.3	2.3	P<0.05	12.26	5.6	P<0.01
Mortality rate (0-30 days) (%)	1.3	0	P<0.01	8.4	3.2	P<0.01
Mortality rate (30-45 days) (%)	0	0	NS	2.2	0	P<0.01
Mortality rate (After weaning) (%)	0	0	NS	1	0	NS
Weaning weight (kg)	18.68±1.05	19.65±1.02	NS	12.21±2.06	14.86±2.22	P<0.05

While examining Table 3, it is understood that the number of lambs for Awassi breed is 83 and 86 and for ChiosxAwassi crosses, 132 and 138 for the control and treatment group, respectively. The mean birth weight of the lambs was 4.8±0.5 and 4.6±0.2 kgs for Awassi control and treatment groups and 2.1±0.1 and 1.9±0.3 kg for ChiosxAwassi crosses. The mean weaning weight of the lamb was 18.68±1.05 and 19.65±1.02 kg for Awassi control and treatment groups and 12.21±2.06 and 14.86±2.22 kg for ChiosxAwassi crosses. Differences between groups were statistically significant (P<0.01). In the number of lambs, the Chios breed is superior with 1.03 versus 1.72, and the mean birth weight is 2.0 versus 4.7 versus the Awassi breed is superior (Table 3). The 0–14 day mortality rate in Awassi sheep was 2.3 versus 5.3 for the Awassi control and treatment group. It was higher in the control groups with 12.26 versus 5.6 for the treatment group in ChiosxAwassi crosses.

In this study, it was observed that the fertility values of pure Awassi ewes were lower than Chios Awassi crossbred ewes, but Awassi lambs had a higher average in terms of living lamb rates (Table 3).

Mortality and growth rates of Awassi and Chios x Awassi lambs are given in Table 4. The effect of breed on 0-30 and 0-14 day mortality rates was determined as P<0.05, and at the level of P<0.01 in the period between 15-30 days. The differences between breed groups are statistically significant (P<0.01). There were no lamb loses after 30 days and in the post-weaning period.

Table 4
The comparison of mortality and development rate of Awassi and Chios x Awassi lambs

Traits	Awassi	Chios x Awassi	f
Mortality rate (0-14 days) (%)	2.3	5.6	P<0,05
Mortality rate (0-30 days)	0	3.2	P<0,01
Mortality rate (30-45 days)	0	0	NS
Mortality rate (After weaning)	0	0	NS
Birth live weight (kg)	4.6±0.2	1.9±0.3	P<0.01
Weaning weight (kg)	19.65±1.02	14.86±2.22	P<0.01

The fact that the fertility of the Chios x Awassi sheep is higher than that of the Awassi sheep can be explained by the effect of the reproductive ability of the Chios sheep, which is included in the genetic structure of the Chios x Awassi crossbreed sheep. As a result of the comparison made in terms of the number of sheep giving birth to twins (twin rate), the observed variables were found to be statistically insignificant.

The weighing weight of lambs has increased from 18,61 to 19,65 kg for the (Awassi) group and from 12,21,3 kg to 14,86 kg for (Chios x Awassi) group with notable superiority for the lambs received yeast supply as shown in Figure 1. From table 4, it appears that lambs received feed supplement had a more cumulate body weight gain than those of control group (19.65±1.02 kg vs. 18.68±1.05 kg for Awassi and 14.86±2.22 kg vs.12.21±2.06 for Chios x Awassi crossbreed statistical analysis revealed that weighing weight of the groups differ each other ($P<0,05$).

Boran and Torun (2018) report the lambing rate for Awassi as 64.00%. Turkyilmaz et al. (2021) reported the survivability of Awassi lambs from weaning to 96.2%, 84.6% and 80.8%. Üstüner (2007) reports Awassi sheep birth rate and lamb yield as 85.71% and 96.43%. Tekin et al (2001) reported the survivability of 75.47% and 90.6%. As a result of this study, the lambing rate of Awassi sheep was higher than the values of Boran and Torun (2018) and Turkyilmaz et al. (2021); Üstüner (2007), Tekin ve ark (2001).

4. Conclusions

The comparison of mortality and development rate of Awassi and Chios x Awassi lambs showed that the feed additive usage decreased mortality rate with higher weaning weight. Lamb number and higher body weight at weaning time is very economical advantages for producer. Here, the Chios crosses sheep gave birth to twins, but the mortality rate is high because there are small births weights and there are no multiples. The teat diameter and maternal instinct of the Chios sheep cross is also weak, therefore, it is necessary to emphasize the importance of such practices in order to reduce mortality, especially in this group.

Our results showed that the using Diakes products in the diet of lambs which may stimulates rumen microorganisms and leads to a better performance.

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