

The Investigation of Possible Use of Unmarketable Cracked Eggs in Lamb Milk Replacer

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SUMMARY

This study was conducted to determine the possible use of unmarketable cracked eggs (UCE) in milk replacer. Twenty lambs, approximately 3 d old, were used in a randomly allocated to two groups each consisting of 10 lambs. First group was fed with milk as liquid feed (**Milk group**) and the other group was fed with lamb milk replacer (LMR) as liquid feed (**LMR group**). Alfalfa hay and concentrate feed were given *ad libitum*. The effect of each ration was investigated with regard to the feed intake, body weight gain and feed efficiency in lambs. Among the trial period (1-56th d) daily feed intake in milk and LMR groups was found for hay average 99.83 g and 93.75 g ($p>0.05$), for concentrate average 327.99 g and 314.79 g, respectively ($p>0.05$). Liquid feed (milk and LMR) were given average 500 ml/d in to the both groups during the 1-56th d. Daily body weight (BW) gain and feed conversion ratio in Milk and LMR groups were 248.75 g and 244.28 g ($p>0.05$), 2.08 and 2.02 ($p>0.05$), respectively. To be result of, we opinion, unmarketable eggs may be use for suckling lambs feeding and the proteins of LMR approximately 58 % will be able to providing from UCE.

Keywords : Milk - milk replacer - cracked egg - performance - lamb.

RÉSUMÉ

Possibilité d'utilisation des œufs cassés non-vendus dans le lait de remplacement. Par T. GÜLER, M. ÇİFTÇİ, O.N. ERTAS, I.H. ÇERÇİ et B. DALKILIÇ.

Cette étude a pour but de déterminer la possibilité d'utilisation des œufs cassés non-vendus dans le lait de remplacement. Nous avons travaillé avec 20 agneaux âgés d'environ 3 jours. Les agneaux ont été randomisés en deux groupes de 10. Le premier groupe a été nourri au lait (Groupe lait) et le deuxième au lait de remplacement (Groupe LDR) à raison de 500 ml par jour. Les deux groupes ont été nourris au trèfle et à l'aliment concentré *ad libitum*. Nous avons évalué dans les deux groupes la consommation alimentaire, l'augmentation de poids vif et l'efficacité alimentaire. Durant la période d'essais (1-56^{ème} jours), pour les groupes Lait et LDR respectivement, la consommation journalière en trèfle était de 99.83 g et 93.75 g ($p>0.05$) et en aliment concentré était de 327.99 g et 314.79 g ($p<0.05$). Dans groupes, Lait et LDR respectivement, l'augmentation de poids vif journalière était de 284.75 g et 244.28 g ($p<0.05$) et l'efficacité alimentaire journalière était de 2.05 et 2.02 ($p>0.05$). En conclusion, il est possible d'apporter le 58% des protéines du lait de remplacement par les cassées non-vendus.

Mots-clés : Lait - remplacement de lait - œufs cassées - performance - agneau.

Introduction

Suckling lambs feeds must be highly digestible and include rich nutrients for an adequate and balanced growing up. For this purpose, rations of growing animals must contain appropriate feeds. Milk presents a source of basal nutrients for pre-ruminants. But, it is more expensive than the other source of nutrients [19]. For this purpose, alternative feeds to be cheap and high nutrients are investigated in suckling animals feeding. Recently, feeds of animal source were used to be alternative feeds in milk replacer [5, 8, 10, 12, 17, 19, 20]. Egg is among those have been used as feeds, because, considerable number of eggs get cracked either during transport, storage or during marketing [2, 9, 18, 25] and most of these are not at consumable quality for human [25] and these eggs are cheaper according to whole milk. Besides, sometimes it is free.

Egg is an important alternative feed ingredient that contains high quality crude protein and crude fat [19]. Its amino acid profile and biological value of protein are excellent [27]. They are high in nutrients (highly nutritious) yet their high quality protein is used as a standard for the assessment of the protein quality of other feedstuffs [23]. The egg

fat contains significant lecithin, which can provide emulsifying properties to milk replacers [19]. Therefore, recently, this quality protein and fat source was attracted attention to researchers and in limited research egg was used as an alternative nutrient in animal nutrition [10, 12, 19, 21]. In some researches it was found that egg in milk replacer was affected negatively to feedlot performance and feed efficiency [19, 21], whereas in some authors reported that the protein in milk replacer of 15 % [10] and 30 % [12] will provide from egg.

Whey is the liquid by-product of cheese production. According to, fluid whey is about 92-93 percent water, includes approximately half of the original nutrients of milk, including protein, Ca, and lactose. Whey offers human and animals both liquid and dried due to including high-quality protein [26], calcium, and vitamins. To be quite cheap whey offers nutrients for lambs and calves [6, 13] in growing period, and uses after dried in milk replacers [14, 24].

In farm conditions, generally milk has used in suckling lambs feeding. But, this is an expensive feeding method. Therefore, we aimed prepare an alternative and cheap lamb milk replacer (include raw egg and whey) to milk in farm

conditions. Because, egg and whey in prepared lamb milk replacer are rather cheap according to milk and easily find in farm conditions. For this reason, in this study, we preferred compare to lamb milk replacer with raw milk instead of another a concentrate milk replacer.

It has been thought that, as a high quality nutrient, unmarketable cracked eggs could be used in animal nutrition and a few studies have been carried out on that respect. In these studies, eggs were used as a supplement to milk replacers following drying [10, 19, 21]. However, to the best of our knowledge, there is no study in which the use of raw egg in suckling lambs feeding. Therefore, the aim of current study was to explore the usage of unmarketable cracked eggs as a supplement of protein and other nutrients to milk replacer and to compare their effects with milk and investigate the effect of prepared lamb milk replacer on feedlot performance and feed conversion ratio in lambs in farm condition.

Materials and Methods

Twenty lambs approximately 3 d old were involved. At the beginning of the study lambs were treated for internal and external parasites. Animals were divided into two equal groups. Hay (alfalfa), concentrate, milk and whey were provided from Research and Application Farm of Firat University (RAFUF, Elazığ, Turkey). Cracked eggs were provided BY a commercial laying hens company (Umut Tavukçuluk, Tic. A.Ş., Elazığ, Turkey). The liquid feeds given animals were constituted of trial groups. These groups were **Milk group** with milk and **LMR group** with lamb milk replacer (milk+whey+egg). While the milk replacer prepared, eggs were mixed in a mini mixer after separated from shell and added to milk+whey mixture. Milk and egg were used as raw and whey was used as fresh in LMR.

Trial was conducted in RAFUF in individual cages. Lambs were weighed to be hungry at the start of the experiment. Then lambs were assigned two groups on the basis of live weight. Trial was started same time in groups and far total 70 d (14 d accustom period and 56 d trial period). In accustom period, the program was followed in LMR groups passing from milk to LMR is summarized in table I. The formulation of experimental lamb milk replacer was: 29% milk, 29% whey and 42% eggs. The one of concentrate feed was: 78% barley, 20% soybean meal, 1.5% limestone, 0.5% salt and vitamins.

Milk and LMR were given to lambs during 15-29th d 600 ml/d (103.2 g DM/d), during 29-43th d 500 ml/d (88.25 g DM/d) and during 43-57th d 400 ml/d (70.6 g DM/d). Lambs were sucked twice daily (08.00 h and 16.00 h) by a feeding bottle. Hay, concentrate and water were given *ad libitum*. Feed intake was recorded daily for each lamb kept in individual cages Lambs were weighed every 14 d to be hungry until end of the study and this weighs were divided 14 and determined daily BW gain. For the determination of feed conversion ratio, daily feed intake was divided to daily BW gain.

Profit estimates for each group were calculated from total feed intake, feed cost and daily gain data as follows. Cost of total feed intake, \$/per animal (56d) = Total feed intake (kg/animal) x cost of feed intake, \$ (56d)/ total live weight gain, kg. Net Profit, \$ = Cost of feed of 1 kg live weight gain for lambs fed diet containing milk, \$-Cost of feed of 1 kg live weight gain for lambs fed diet containing LMR, \$.

Chemical composition of feed ingredients (dry matter, crude protein, ash and ether extract) dried samples were analyzed using AOAC [1] procedures, and crude fiber was determined by the methods of CRAMPTON and MAYNARD [4].

All data were subjected to analysis of Mann-Whitney U test using procedures of SPSS statistical program [22].

Results and Discussion

Daily feed intake at days 1-56 of the experiment are presented in Table II. From 1 to 56 days, lambs in both groups were consumed equal liquid feed and daily hay and concentrate intake were similar. There was no statistically different for feed intake between groups ($p>0.05$).

The BW gain and daily BW gain at days 1-56 of the experiment are presented in Tables III and IV. Both BW and daily BW gain were similar in groups ($p>0.05$). Daily BW gain was found as 248.75 g in milk group and as 244.28 g in LMR group. The reason of this result may be due to similar feed intake in groups and similar chemical composition using feeds.

From days 1 to 56 feed conversion ratios were not significantly different ($p>0.05$). But, at day 56, feed conversion ratio in LRM group was improved approximately 3 % compared to Milk group. This result may be due to differences of

Days	Milk, %	LMR, %
1-2	50	50
3-5	40	60
6-8	30	70
9-11	20	80
12-14	10	90
15>	-	100

TABLE I. — The formulation of diet in accustom period.

Days	Alfalfa hay, g/d				Concentrate g/d			
	Milk	LMR	SEM	Sig.	Milk	LMR	SEM	Sig.
1-14	44.28	41.51	0.39	NS	80.55	70.28	1.34	NS
15-28	100.64	85.90	1.49	NS	293.85	267.19	3.21	NS
29-42	84.07	86.82	0.51	NS	383.43	371.63	1.54	NS
43-56	170.35 ^a	160.79 ^b	2.28	*	554.14	550.05	0.81	NS
1-56	99.83	93.75	1.25	NS	327.99	314.79	1.78	NS

NS : $p > 0.05$, *: $p < 0.05$

TABLE II. — Daily fed intake in groups, g (n= 10).

Days	Milk	LMR	SEM	Significant
Initial	8.82	8.82	0.22	NS
14	12.20	11.98	0.35	NS
28	15.80	15.50	0.32	NS
42	19.32	19.10	0.36	NS
56	22.75	22.50	0.38	NS

NS : Non significant ($p > 0.05$)

TABLE III. — Body weight in groups, kg (n= 10).

Days	Milk	LMR	SEM	Significant
1-14	241.43 ^a	225.71 ^b	4.55	*
15-28	257.14	251.43	0.71	NS
29-42	251.43	257.14	0.72	NS
43-56	245.00	242.86	0.45	NS
1-57	248.75	244.28	0.42	NS

NS : $p > 0.05$, *: $p < 0.05$

TABLE IV. — Daily body weight gain in groups, g (n= 10).

	Milk, %	LMR, %	SEM	Sig.
Cost of liquid feed, \$/L	0.53	0.30	-	-
Total feed intake cost, \$/per animal	19.68 ^a	13.03 ^b	2.30	*
Feed cost of 1 kg BW gain, \$	1.41	0.95	-	-
Net profit, \$/ per animal		0.46		

TABLE V. — Economic analysis.

liquid feeds in treatment rations. Because, while used milk as liquid feed in Milk group, milk-egg-whey mix was used in LMR group. It is known, egg was better from the point of view of protein quality and essential amino acid composition than milk. Similarly, in some literatures reported that, feed conversion ratio increases with the increase in protein quality in ration [3, 7, 11, 15, 16].

Economic analysis among groups was summarized in Table V. Economic coefficients assumed for diets were based on average of Elaziğ (TURKEY) prices. The price of milk and LMR per liter were 0.53 \$ and 0.30 \$, respectively. The cost of total feed intake was 19.68 \$ in Milk group and 13.03 \$ in LMR groups, respectively ($p < 0.05$). In feed cost of 1 kg BW gain were 1.41 \$ and 0.95 \$ in groups. Net profit in feed

cost of 1 kg BW gain between groups was 0.46 \$. This difference in groups may be due to the cost of liquid feeds. Because, while the cost of milk 0.53 \$, the cost of LMR 0.30 \$. The reason of cheaper cost of LMR due to egg and whey are cheaper than milk. When milk and LMR groups were compared, lambs fed with LMR provided gain at cheaper price than lambs fed milk.

Some different findings have been reported in limited researches for the determination of egg to be used in milk replacer. KELLOGG et al. [12] reported acceptable feed intake and BW gain when calves were fed with milk replacer containing 30 % egg protein in calves. HILL et al. [10] reported that 15 % of crude protein from egg protein did not negatively affect animal performance compared with calves fed with milk replacer. Conversely, some study reported reduction in the BW gain and feed conversion ratio in parallel with increase in egg protein in milk replacers [19, 21]. In our study, although amount of crude protein was approximately 58% in LMR provided from egg, no negative effect was observed. Differences in animal performance among the studies may reflect differences in sources and composition of milk replacers, methods of providing and methods of processing.

Unfortunately, reports on the use of egg in animal nutrition are limited. This study showed that as a quality source of protein and fat unmarketable cracked eggs may be used as alternative and cheap protein source in LMR instead of expensive milk protein.

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