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Holstein Irkı Buzağılarda İçirilen Sütün Bazı Bileşenlerinin Büyüme Performansı Üzerine Etkileri

İbrahim Cihangir Okuyucu[1], Hüseyin Erdem[*1]
[1]*Zootekni Bölümü, Ziraat Fakültesi, Ondokuz Mayıs Üniversitesi 55139- Samsun, Türkiye*
[*]*herdem@omu.edu.tr*

ÖZET

Bu çalışma, Holstein buzağıların içtikleri süt bileşiminin büyüme performansları üzerine etkilerini belirlemek amacıyla yapılmıştır. Doğumdan sonraki 15, 30, 45 ve 60. günlerde buzağılara içirilen sütteki kuru madde (KM), yağ, protein ve laktoz oranları, belirlenerek canlı ağırlık (CA), cidago yüksekliği (CY), vücut uzunluğu (VU), göğüs derinliği (GD), göğüs genişliği (GG), göğüs çevresi (GÇ) ve sağrı yüksekliği (SY) belirlenmiştir. Sütteki yüksek KM oranı, tüm dönemlerdeki buzağıların CA, GÇ, GG ve GD ve 15. gün CY ve canlı ağırlık artışını (CAA) etkilemiştir. Yüksek yağ içeren sütlerle beslenen buzağıların tüm dönemlerdeki CA, GÇ ve GD, ayrıca 15. gün CA, SY ve VU ölçümleri etkilenmiştir. Laktoz ve protein oranları ise 15 ve 30. günlerdeki GG, 45. gündeki CAA ve 60. gündeki GÇ ölçümlerini etkilemiştir. Yüksek yağ içeren sütle beslenen buzağılarda TCAA ve GCAA sırasıyla 34,86±1,103 kg ve 0,58±0,018 kg, düşük düzeyde yağ oranına sahip sütle beslenenlerde ise sırasıyla 29,01±1,326 kg ve 0,48±0,022 kg olarak belirlenmiştir.

Anahtar kelimeler: Holstein, Süt bileşeni, Buzağı, Büyüme performansı

Effects Of Some Mılk Compounds On Growth Performance In Holsteın Calves

ABSTRACT

The effects of milk compounds on growth performance of Holstein calves were investigated. Dry matter (DM), fat, protein and lactose were tested as milk traits and live weight (LW), withers height (WH), body length (BL), chest depth (CD), chest width (CW), chest girth (CG) and rump height (RH) were measured as growth traits at 15th, 30th, 45th and 60th days post calving. While DM affected LW, CD, CW and CG for all periods, it affected WH and live weight gain (LWG) for 15th day. Milk with higher fat affected LW, CG and CD for all periods and affected LW, RH and BL for 15th day. Lactose and protein affected CW at 15th and 30th days, LWG at 45th day and CG at 60th day. Calves fed with higher fat had 34.86±1.103 kg TLWG and 0.58±0.018 kg DLWG and fed with low fat had 29.01±1.326 kg TLWG and 0.48±0.022 kg DLWG.

Keywords: Holstein, Milk composition, Calf, Growth performance.

INTRODUCTION

In dairy enterprises, it is essential to obtain optimum milk production from each cattle and calves per year depending on the farm conditions (Selk, 2003; Yüceer and Özbeyaz, 2010). The calves obtained from the cows in this enterprises have to raise and feed efficiently. A significant effect of breeding and feeding conditions during the calf period on the performance of young animals that will provide the continuity of herd has been reported (Yüceer and Özbeyaz, 2010; Erez and Göncü, 2012).

As a general practice, the amount of milk fed by a calf is about 10% of the birth weight, however, it can be increased up to 20%, and thus, calf development, feed conversion rate and resistance to diseases may elevate with this increment (Khan et al, 2011). At this point, it is thought that hygienic and healthy growing conditions have an impact on newborn calf growth and development as well as immunity against diseases in the early stages of her life. In other words, revealing milk composition and to managing appropriate nutrition programs should be considered important step in dairy herds.

Studies on the milk and milk composition of Holstein cows have a wide variation according to management and feeding conditions. Genetic merits of experimental cows according to rearing conditions have also emphasized as different in the locations where the studies carried out (Ayaşan et al., 2012; Şekerden, 1999; Koçbeker, 2015; Koç, 2011; Önal and Özder, 2007; Yaylak et al., 2007; Çelik and Koç, 2013).

Similarly, the growth performance of calves is influenced by many non-genetic factors, mainly feeding conditions. Therefore, different results have been informed in the studies carried out in order to show the growth performance (Eivazi et al., 2013; Bayrıl et al., 2015). It has been reported that calves fed with high-protein milk replacers had exposed to increase in live weight (LW), body length (BL), withers height (WH) and chest width (CW) measurements (Blome et al., 2003). Similarly, many researchers emphasized that increasing energy and protein intake during 2-14 weeks of age affects LW and WH in calves (Brown et al., 2005; Bartlett et al., 2006; Cowles et al., 2006). Researchers indicate that increased energy and protein intake may increase the rate of body growth of heifers and reduce the cost of breeding. Moreover, (Morisson et al., 2009) emphasize that the effect of the increase in the protein of milk replacer feeds in the milk feeding period removed in the weaning period.

The study carried out by (Kiyıci and Tuzemen, 2012) in the Brown and Holstein calves revealed 330 g of daily live weight gain (DLWG) both Brown and Holstein calves during the milk suckling period of 0-35 days. Also, (Dogan, 2014) and (Tapki et al.,2006) achieved similar results.

To best of our knowledge, there is no focused report on the effects milk traits on growth performance of Holstein calves. Investigating these topics may be expected to improve growth performance of calves, and to ensure important inputs for dairy enterprises. Therefore, this study was carried out to determine the effects of milk composition on growth performance of Holstein calves during suckling period.

MATERIALS AND METHODS

In this study, milk samples and farm records of Holstein cows and their calves reared in seven farms of Konya Livestock Cattle Breeders Association were used the study material. The animals examined in the present study were consisted of 61 cows and 61 calves (38 male and 23 female).

Colostrum feeding was carried out for four days throughout the experiment. After the colostrum period, each calf was fed with milk produced by its own mother. No milk drinking program was applied during the period of milk suckling. During the trial, a calf calves were drunk a total of 5 liters milk per day with 2.5 liters of milk in the morning and 2.5 liters in the

evening. After birth, ad libitum water and calf starter were served after the first week and alfalfa dry grass with good quality was given after 10th day. Troughout the experiment, calves with health problems were removed from the study.

To analyse, approx. 50 cc of milk samples were collected from each cow in the evening milking at 15±3, 30±3, 45±3 and 60±3 days of lactation. The milk samples were homogeniously collected from buckets after milking processes and immediately reached to laboratory by transport containers. All samples were analyzed for determination of milk compositions after heating in a water bath at 32-35℃ by DM, fat, protein and lactose tests. Funke Gerber Lactostar milk analyzer was used to determine the components of milk. After determining the data, averages of the values was obtained by taking the arithmetic mean of all the periods in which the sample were taken. According to averages, the low values were classified as the first group and the high values were taken to the second group.

After birth, the calves measurements of LW, CG, WH, CW, CD, RH and BL were taken at 15±3, 30±3, 45±3 and 60±3 days. While electronic weighing is used in weighing processes, a measuring tape and stick are used in the measuring processes.

The growth characteristics of 15±3, 30±3, 45±3 and 60±3 days and, DL, WG and TLWG at 0-60 days between two groups were compared.

In the statistical work, t-test was performed using SPSS 17.0 for Windows package program.

FINDINGS AND DISCUSSION

In this study, DM, fat, protein and lactose proportions were determined as 11.06±0.81%, 3.24±0.50%, 2.81±0.24% and 3.84±0.26% respectively in the milk samples taken from 61 heads. These results are similar to the results of the study from (Koçbeker, 2015), but were found to be lower than the values reported by (Ayaşan et al., 2012) and (Şekerden, 1999). The mean DM, fat, protein and lactose proportions in the cow milk of the study conducted by Koç (2011) were determined as 11.47±0.148%, 3.24±0.109%, 2.85±0.059% and 4.53±0.041% respectively, and these results are in line with our study except for lactose. As seen, the results here did not reflect the lactation averages for Holstein cows, and the levels might be assumed as lower than the average due to the milk samples were taken in the first 60 days of lactation. The differences of our findings with similar study results might also been caused by the differences in feeding practices of the farms or different lactation periods of the cows.

It was also determined that LW, CG, CW, CD, BL, LWG ($P<0.01$) and RH ($P<0.05$) measurements of the 15th day of the calves in the second group in which calves fed milk with highest DM were positively affected, and the calves showed higher growth performance than the calves in the first group fed with low DM content (Table 1). Similarly, in this period, LW, CG, RH, BL, LWG ($P<0.01$) WH and CD ($P<0.05$) values were found higher in the calves fed with high-fat milk. The similar effect of percentage of fat, which is one of the important components of DM, with DM might be assumed to be an expected result. In the same period, similar effects were not observed fed with milk including high protein and lactose proportion. The CW of calves suckled milk with high protein and lactose was found to be higher than those fed with low content milk ($P<0.05$). However, these two components did not affect other growth characteristics. Besides, the increase in DM and fat content of milk positively affected the LWG of calves in this period ($P<0.01$).

While the mean values of LW, CG, WH, CD, BL of calves were determined as 56.22±0.880 kg, 84.93±0.440 cm, 77.25±0.447 cm, 30.33±0.249 cm and 76.18±0.550 cm in the 30±3 days of age, Tapkı et al. (2006) calculated same measurements in 28 days age calves as 49.42±2.445 kg, 86.83±1.811 cm, 77.58±1.234 cm, 31.25±1.111cm and 72.08±2.310 cm, respectively. However, the LW and BL values were found as higher than the findings of

Tapkı et al. (2006). Also, the second group with a high level of DM in the drinking milk was found to have higher LW, CG, CW and CD values than 1st group with low DM ($P<0.01$) (Table 2). In the same period, the calves fed with high-fat milk had higher LW, CG, CD ($P<0.01$), CW and RH ($P<0.05$) values. Also, while all four milk components were effective on CW in this period, the effect of protein and lactose proportion was determined as significant at the level of $P<0.05$ as similar to 15th day. In this period, effect of DM and fat percentage on growth traits was rarely observed when compared to 15th days. It is thought that this case might be caused by the beginning of consumption of other feeds by calves in addition to milk in this period.

The average LW, CG, WH, CW, CD, RH and BL values for the 45-day age of the calves were determined as 64.96±1.112 kg, 89.00±0.524 cm, 79.82±0.435 cm, 23.63±0.254 cm, 32.10±0.303 cm, 85.08±0.452 cm and 80.14±0.591 cm, respectively (Table 3). In this period, the LW, CG, CW and CD of the calves fed with higher DM was found as higher ($P<0.01$). Also, it was determined that high level of DM consumption had no statistical differences on the other body measurements. Similar to the other periods, LW, CG, WH, CD ($P<0.01$), CW and RH ($P<0.05$) measurements of calves fed higher fat proportion showed a higher performance than those fed low fat proportion and those calves were significantly affected by the elevation of fat in the consumed milk. The other growth characteristics were not statistically different in calves fed with milk including higher protein and lactose except for LWG when compared to other group. However, average LWG of the calves was 8.35±0.362 kg in this period, and it was determined that the increase in the level of DM, fat ($P<0.05$), protein and lactose ($P<0.01$) was positively affected LWG. The calves fed high milk with protein and lactose levels were found to be 9.38±0.449 kg, while those fed with milk containing low levels of protein and lactose were found to be 7.27±0.492 kg. Although the effect of protein and lactose proportion on LWG on the 15th and30th days of measurements was not statistically significant, it was observed that LWG was significantly effective at 45th day. All milk components changed the LWG achieved in 30-45 days, and it was determined that calves fed with higher values in terms of components gained more weight.

The average LW, LWG, CG, WH, CW, CD, RH and BL values in the 60th day, which was the last period of the study, were found as 75.42±1.246, 10.10±0.395 kg, 93.29±0.559, 82.69±0.481, 25.14±0.277, 34.00±0.329, 88.10±0.418, and 84.10±0.523 cm, respectively (Table 4). The 60th day CG and BL values of the calves were lower than the mean (100.33±1.91 cm 95.46±3.70 cm) determined by (Doğan, 2014). Besides, other traits appeared a similarity. As parallel to 45th day, increase of DM level during this period was found to be effective on LW, CG, CW, CD ($P<0.01$) and RH ($P< 0.05$), and similar case was also found in the high-fat milk-fed calves and caused an increase in other growth characteristics except for BL ($P<0.01$). In addition, during the period from 45th day to 60th day, increase of DM, fat, protein and lactose in the milk was not effective on LWG. In the group with high protein and lactose, the CG measure was found to be higher than in the low group ($P<0.05$). However, these two milk components did not affect other growth characteristics in this period.

Total and daily live weight gains, a measure of the growth performance of the calves, were determined as 31.69±0.968 kg and 0.53±0.016 kg for 48 calves, respectively (Table 5). This result was similar to TLWG (30.69±0.479 kg) detected by Tapki (2007) in the calves of 4-63 days. Similarly, This study is similar to determined DLWG (0.540 and 0.572 kg) for male and female calves at the period 0-60 days by Bayrıl et al. (2015) and DLWG (0.564 kg) by (Eivazi et al., 2013). In this period, the effect of DM, protein and lactose proportion on TLWG and DLWG was $P<0.05$, while the effect level of fat proportion was $P<0.01$. The TLWG was found to be 34.86±1.103 kg in the high-fat milk-fed calves, whereas 29.01±1.326 kg in the low-fat milk-fed calves. In the first 60-day period, this significant difference was

about 6 kg between two groups. The DLWG was found to be 0.58±0.018 and 0.48±0.022 kg, respectively, in the calves fed milk with high and low fat content. Figures 1 and 2 show changes in TLWG and DLWG from 0 to 60-day age calves fed with milk with high nutrients content for all four milk components.

Table 1. Live weights and body measurements of calves by milk components at 15th day

*P<0.05; **P<0.01; DM: Dry Matter; LW: Live Weight; CG: Chest Girth; WH: Withers Height; CW: Chest Widht; CD: Chest Depht; RH: Rump Height; BL: Body Lenght; LWG: Live Weight Gain; Milk Comp; Milk Component

Period	Milk Comp.	Group	n	LW (kg)	CG (cm)	WH (cm)	CW (cm)	CD (cm)	RH (cm)	BL (cm)	LWG (kg)
				Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
15 Days	DM (%)			**	**		**	**	*	**	**
		1	27	47.32±1.017	80.22±0.573	74.11±0.540	20.37±0.288	27.63±0.351	78.41±0.667	71.26±0.754	4.73±0.447
		2	35	51,57±0.956	82.53±0.552	75.25±0.494	21.16±0.308	29.03±0.343	80.50±0.512	74.63±0.705	7.00±0.544
		Mean	59	49.62±0.744	81.47±0.422	74.73±0.369	21.34±0.241	28.39±0.260	79.54±0.431	73.08±0.556	5.96±0.386
	Fat (%)			**	**	*		*	**	**	**
		1	34	48.01±0.949	80.53±0.529	73.97±0.528	20.97±0.326	27.91±0.339	78.56±0.612	71.74±0.712	5.04±0.439
		2	25	51.82±1.061	82.76±0.612	75.76±0.421	21.84±0.340	29.04±0.376	80.88±0.481	74.92±0.757	7.21±0.614
		Mean	59	49.62±0.744	81.47±0.422	74.73±0.369	21.34±0.241	28.39±0.260	79.54±0.431	73.08±0.556	5.96±0.386
	Protein (%)						*				
		1	30	49.43±1.068	81.30±0.603	74.87±0.514	20.90±0.301	28.20±0.388	79.27±0.608	72.53±0.744	5.52±0.473
		2	31	50.30±1.047	81.90±0.591	74.77±0.544	21.90±0.357	28.81±0.372	79.97±0.602	73.77±0.782	6.48±0.575
		Mean	61	49.87±0.744	81.61±0.420	74.82±0.371	21.41±0.241	28.51±0.269	79.62±0.427	73.16±0.542	6.01±0.376
	Lactose (%)						*				
		1	30	49.43±1.068	81.30±0.603	74.87±0.514	20.90±0.301	28.20±0.388	79.27±0.608	72.53±0.744	5.52±0.473
		2	31	50.30±1.047	81.90±0.591	74.77±0.544	21.90±0.357	28.81±0.372	79.97±0.602	73.77±0.782	6.48±0.575
			61	49.87±0.744	81.61±0.420	74.82±0.371	21.41±0.241	28.51±0.269	79.62±0.427	73.16±0.542	6.01±0.376

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Table 2. Live weights and body measurements of calves by milk components at 30th day

*P<0.05; **P<0.01; DM: Dry Matter; LW: Live Weight; CG: Chest Girth; WH: Withers Height; CW: Chest Widht; CD: Chest Depht; RH: Rump Height; BL: Body Lenght; LWG: Live Weight Gain; Milk Comp; Milk Component

Period	Milk Comp.	Group	n	LW (kg)	CG (cm)	WH (cm)	CW (cm)	CD (cm)	RH (cm)	BL (cm)	LWG (kg)
				Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
30 Days				**	**		**	**			
	DM (%)	1	27	53.70±1.145	83.52±0.576	76.81±0.636	21.63±0.321	29.56±0.363	81.78±0.707	75.59±0.819	6.38±0.531
		2	28	58.64±1.176	86.29±0.561	77.68±0.630	23.07±0.321	31.07±0.281	83.14±0.524	76.75±0.736	7.01±0.585
		Mean	55	56.22±0.880	84.93±0.440	77.25±0.447	22.36±0.245	30.33±0.249	82.47±0.443	76.18±0.550	6.70±0.395
				**	**		*	**	*		
	Fat (%)	1	31	53.93±1.092	83.74±0.543	76.52±0.644	21.90±0.319	29.63±0.330	81.58±0.649	75.61±0.777	6.29±0.477
		2	24	59.17±1.220	86.46±0.605	78.21±0.555	22.96±0.353	31.25±0.290	83.62±0.496	76.92±0.754	7.23±0.658
		Mean	55	56.22±0.880	84.93±0.440	77.25±0.447	22.36±0.245	30.33±0.249	82.47±0.443	76.18±0.550	6.70±0.395
							*				
	Protein (%)	1	27	55.50±1.283	84.44±0.646	77.07±0.539	21.81±0.329	29.93±0.381	82.26±0.598	76.74±0.775	6.63±0.478
		2	28	56.91±1.217	85.39±0.598	77.43±0.717	22.89±0.339	30.71±0.312	82.68±0.661	75.64±0.780	6.77±0.631
		Mean	55	56.22±0.880	84.93±0.440	77.25±0.447	22.36±0.245	30.33±0.249	82.47±0.443	76.18±0.550	6.70±0.395
							*				
	Lactose (%)	1	27	55.50±1.283	84.44±0.646	77.07±0.539	21.81±0.329	29.93±0.381	82.26±0.598	76.74±0.775	6.63±0.478
		2	28	56.91±1.217	85.39±0.598	77.43±0.717	22.89±0.339	30.71±0.312	82.68±0.661	75.64±0.780	6.77±0.631
		Mean	55	56.22±0.880	84.93±0.440	77.25±0.447	22.36±0.245	30.33±0.249	82.47±0.443	76.18±0.550	6.70±0.395

Table 3. Live weights and body measurements of calves by milk components at 45th day

*P<0.05; **P<0.01; DM: Dry Matter; LW: Live Weight; CG: Chest Girth; WH: Withers Height; CW: Chest Widht; CD: Chest Depht; RH: Rump Height; BL: Body Lenght; LWI: Live Weight Gain; Milk Comp; Milk Component

Period	Milk Comp.	Group	n	LW (kg)	CG (cm)	WH (cm)	CW (cm)	CD (cm)	RH (cm)	BL (cm)	LWG (kg)
				Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
45 Days	DM (%)			**	**		**	**			*
		1	24	61.61±1.522	87.46±0.722	78.96±0.588	22.97±0.356	30.96±0.369	84.42±0.752	79.63±0.747	7.56±0.533
		2	27	67.95±1.392	90.37±0.658	80.59±0.607	24.37±0.298	33.11±0.379	85.67±0.520	80.59±0.903	9.05±0.460
		Mean	51	64.96±1.112	89.00±0.524	79.82±0.435	23.63±0.254	32.10±0.303	85.08±0.452	80.14±0.591	8.35±0.362
	Fat (%)			**	**	**	*	**	*		*
		1	28	61.88±1.371	87.61±0.649	78.79±0.552	23.07±0.329	31.11±0.369	84.14±0.668	79.50±0.759	7.62±0.505
		2	23	68.72±1.499	90.70±0.718	81.09±0.606	24.30±0.352	33.30±0.374	86.22±0.507	80.91±0.924	9.23±0.461
		Mean	51	64.96±1.112	89.00±0.524	79.82±0.435	23.63±0.254	32.10±0,303	85.08±0.452	80.14±0.591	8.35±0.362
	Protein (%)										**
		1	25	62.95±1.655	88.16±0.806	79.08±0.535	23.20±0.361	31.56±0.444	84.72±0.639	80.96±0.659	7.27±0.492
		2	26	66.90±1.420	89.81±0.652	80.54±0.662	24.04±0.344	32.62±0.396	85.42±0.645	79.35±0.959	9.38±0.449
		Mean	51	64.96±1.112	89.00±0.524	79.82±0.435	23.63±0.254	32.10±0.303	85.08±0.452	80.14±0.591	8.35±0.362
	Lactose (%)										**
		1	25	62.95±1.655	88.16±0.806	79.08±0.535	23.20±0.361	31.56±0.444	84.72±0.639	80.96±0.659	7.27±0.492
		2	26	66.90±1.420	89.81±0.652	80.54±0.662	24.04±0.344	32.62±0.396	85.42±0.645	79.35±0.959	9.38±0.449
		Mean	51	64.96±1.112	89.00±0.524	79.82±0.435	23.63±0.254	32.10±0.303	85.08±0.452	80.14±0.591	8.35±0.362

Table 4. Live weights and body measurements of calves by milk components consumed at 60th day

*P<0.05; **P<0.01; DM: Dry Matter; LW: Live Weight; CG: Chest Girth; WH: Withers Height; CW: Chest Widht; CD: Chest Depht; RH: Rump Height; BL: Body

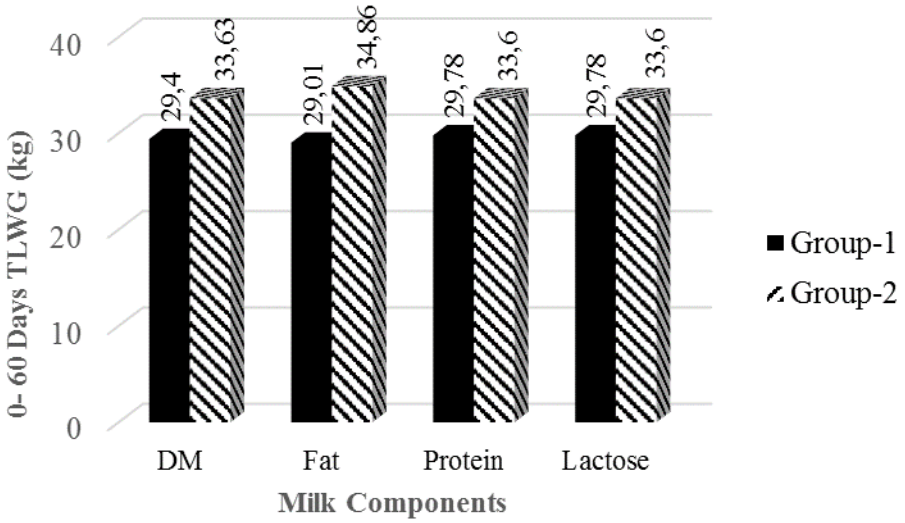
Period	Milk Comp.	Group	n	LW (kg)	CG (cm)	WH (cm)	CW (cm)	CD (cm)	RH (cm)	BL (cm)	LWG (kg)
				Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
60 Days	DM (%)			**	**		**	**	*		
		1	22	71.81±1.829	91,52±0,829	81.27±0.720	24.26±0.368	32.74±0.357	87.17±0.679	83.65±0.667	10.03±0.614
		2	26	78.47±1.484	94.85±0.622	83.42±0.623	25.92±0.346	35.12±0.431	88.92±0.464	84.50±0.793	10.15±0.522
		Mean	48	75.42±1.246	93.29±0.559	82.69±0.481	25.14±0.277	34.00±0.329	88.10±0.418	84.10±0.523	10.10±0.395
	Fat (%)			**	**	**	**	**	**		
		1	26	71.66±1.589	91.56±0.717	81.56±0.643	24.48±0.339	32.93±0.370	86.93±0.585	83.67±0.696	9.62±0.645
		2	22	79.86±1.518	95.41±0.647	84.09±0.617	25.95±0.397	35.32±0.438	89.55±0.435	84.64±0.794	10.67±0.383
		Mean	48	75.42±1.246	93.29±0.559	82.69±0.481	25.14±0.277	34.00±0.329	88.10±0.418	84.10±0.523	10.10±0.395
	Protein (%)				*						
		1	24	73.08±1.912	92.08±0.877	82.24±0.638	24.80±0.351	33.48±0.455	87.76±0.601	84.36±0.697	9.50±0.703
		2	24	77.76±1.489	94.54±0.599	83.17±0.724	25.50±0.426	34.54±0.458	88.46±0.584	83.83±0.793	10.69±0.334
		Mean	48	75.42±1.246	93.29±0.559	82.69±0.481	25.14±0.277	34.00±0.329	88.10±0.418	84.10±0.523	10.10±0.395
	Lactose (%)				*						
		1	24	73.08±1.912	92.08±0.877	82.24±0.638	24.80±0.351	33.48±0.455	87.76±0.601	84.36±0.697	9.50±0.703
		2	24	77.76±1.489	94.54±0.599	83.17±0.724	25.50±0.426	34.54±0.458	88.46±0.584	83.83±0.793	10.69±0.334
		Mean	48	75.42±1.246	93.29±0.559	82.69±0.481	25.14±0.277	34.00±0.329	88.10±0.418	84.10±0.523	10.10±0.395

Lenght; LWI: Live Weight Gain; Milk Comp; Milk Component

Table 5. Total and daily live weight gains in 0-60 day period by milk component groups

*P<0.05; **P<0.01; DM: Dry Matter; TLWI: Total Live Weight Gain; DLWG: Daily Live Weight Gain

Milk Component	Group	n	0-60 Days TLWG (kg)	0-60 Days DLWG (kg)
			Mean±SE	Mean±SE
			*	*
DM (%)	**1**	22	29.40±1.434	0.49±0.024
	2	26	33.63±1.209	0.56±0.020
	Mean	48	31.69±0.968	0.53±0.016
			**	**
Fat (%)	**1**	26	29.01±1.326	0.48±0.022
	2	22	34.86±1.103	0.58±0.018
	Mean	48	31.69±0.968	0.53±0.016
			*	*
Protein (%)	**1**	24	29.78±1.496	0.50±0.025
	2	24	33.60±1.127	0.56±0.019
	Mean	48	31.69±0.968	0.53±0.016
			*	*
Lactose (%)	**1**	24	29.78±1.496	0.50±0.025
	2	24	33.60±1.127	0.56±0.019
	Mean	48	31.69±0.968	0.53±0.016



Figüre 1. Change of TLWG in 0-60 days by milk components

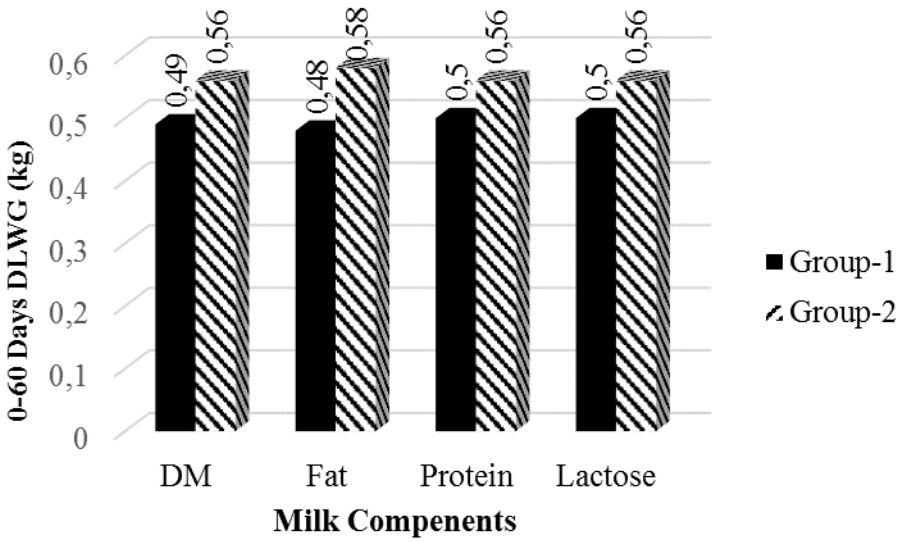


Figure 2. Change of DLWG in 0-60 days by milk components

RESULTS

As a result, the increase of DM, fat, protein and lactose levels during the milk drinking period positively was affected the growth performance of the calves. Particularly, the increase in DM and fat proportion was found to be significantly effective in the four periods in which growth characteristics were determined. It was determined that calves fed with high-component milk shown better growth performance. These results may indicate the necessity of using rich milk compononents in the feding of the calves in conditions where the nutritional content is not taken into consideration in the marketing of milk and therefore not priced according to quality. The use of milk with higher fat and DM may be seen beneficial for calf growth. This case will ensure a positive effect on the health and survival rate of the calves as far as weaning age and obtain better growth.

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