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Holsteın Irkı İneklerde Kolostrum Kalitesini Etkileyen Bazı Faktörler ve Kolostrum Kalitesi ile Barındırma Şeklinin Buzağıların Büyüme Performansına Etkileri

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ÖZET

Bu çalışmada, Holstein ırkı ineklerin kolostrum kalitesi üzerine bazı çevresel faktörlerin etkilerini belirlemek ve kolostrum kalitesinin buzağılarda büyüme performansı üzerinde nasıl bir etki yarattığını ortaya koymak amaçlanmıştır. Bireysel barındırılan buzağıların 15 günlük yaş dönemindeki canlı ağırlık (CA) ve göğüs genişliği (GG) daha yüksek bulunmuştur. Bireysel kulübelerde yetiştirilen buzağıların 15. gün CA ortalamaları 51.04±0.981 kg, grup halinde yetiştirilenlerin ise 47.82±0.991 kg olarak belirlenmiştir. Barındırma şeklinin CA, göğüs çevresi (GÇ), cidago yüksekliği (CY), ve GG üzerinde etkili bulunmuştur. Ayrıca söz konusu faktörün doğum-60. günler arasında canlı ağırlık artışlarını da etkilediği, en yüksek toplam (33.27±1.195 kg) ve günlük (0.555±0.0199 kg) canlı ağırlık artışlarının bireysel kulübelerde yetiştirilen buzağılarda belirlendiği gözlemlenmiştir. Grup halinde barındırılan buzağıların toplam ve günlük ağırlık artışları ise sırasıyla 29.05±1.481 kg ve 0.484±0.0247 kg olarak bulunmuştur.

Anahtar kelimeler: Holstein, Kolostrum, Buzağı, Büyüme, Barındırma

Non-Genetıc Factors Affectıng Colostrum Qualıty And Effects Of Barnıng Type And Colostrum Qualıty On Growth Performance Of Holsteın Calves

ABSTRACT

The aims of this study were to reveal the factors affecting colostrum quality (CQ) and the effects of CQ on growth performance in Holstein calves were examined. CQ was determined at birth, 24th, 48th and 72nd h and, live weight and body measurements were recorded at 15th, 30th, 45th and 60th days. Live weight (LW) and chest depth (CD) for 15th d were found to be higher in calves barned as individual. The LW means at 15th d for individual and group barning were calculated to be 51.04±0.981 kg and 47.82±0.991 kg, respectively. Barning type significantly affected LW, chest girth (CG), withers height (WH) and chest width (CW). Calves barned as individual had highest total (TLWG; 33.27±1.195 kg) and daily live weight gain (DLWG; 0.555±0.0199 kg) between birth and 60th d. At this time, TLWG and DLWG of calves in groups were calculated as 29.05±1.481 kg and 0.484±0.0247 kg, respectively.

Keywords: Holstein, Colostrum, Calf, Growth, Barning

INTRODUCTION

In dairy enterprises, rearing young animals within sustainable production is a common practice to achieve productive herds. Therefore, health conditions and loss rate of calves are regarded as the main topics for continuity of the herd in addition to birth weights and performances during the growth period. One of the most important reasons for the loss of calves is the inability of the calves to passive immunity after birth, and the absence of good quality colostrum (Genc, 2015). It is well known that calves drinking adequate and good quality colostrum ensure sufficient passive immunity and gain better growth performance in certain age ranges (Godden, 2008; Bielmann et al., 2010; Yüceer and Özbeyaz, 2010).

Although the first milk taken from the mothers after birth is termed as actual colostrum, up to six or ten milkings may be accepted as colostrum. After the first postpartum milking, it is defined as transition milk due to the components in the colostrum approach to normal milk values (Erdem and Atasever, 2005; Hoyraz et al., 2015; Genc, 2015). The quality of colostrum is determined by the amount of immune protein contained in the colostrum, and the immune proteins are called immunoglobulin (Ig) (Hoyraz et al., 2015). Many enviromental factors on the quality of colostrum have been reported, such as dry period length, difficulty calving, live weight, breed, parity, age, colostrum leak from the nipple before birth, corticosteroid use, calving season, body condition score and nutritional status (Morin et al., 2001; Selk, 2003; Erdem and Atasever, 2005; Jaster, 2005; Kaygısız and Köse, 2007; Kehoe et al., 2007; Godden, 2008; Gomes et al., 2011; Angulo et al., 2015; Le Cozler et al., 2016). However, Genc (2015), who examined the influence of some environmental factors on the quality of colostrum in Holstein cows, found no significant effect of parity and dry period length. Although the effect of calving season and calf gender on the quality of colostrum was negligible in the study carried out by Kaygısız and Köse (2007), the effect of mother age and dry period length was found significant ($P<0.05$). Gulliksen et al., (2008) reported that immunoglobulin G (IgG) levels in the colostrum were higher in cows with four or more lactations than in cows with first, second and third lactation and, lowest in cows with second lactation. Kehoe et al., (2011) determined that IgG levels in the colostrum of cows with >3 parities were higher than those in 1st and 2nd parity. Morin et al. (2001) also emphasized that the quality of colostrum was related to breed of cow, parity, calving month and calving years. Kume and Tanabe (1993) reported that specific gravity of the colostrum of primiparous cows was lower than multiparous cows ($P<0.01$). While the specific gravity of colostrums collected post calving in cows with 1 to 4 parities were found to be 1.059, 1.066, 1.070 and 1.064 g/ ml respectively by researchers, these levels were calculated to be 1.051, 1.063, 1.069, 1,066 g/ml, respectively, by Göncü et al., (2013).

The daily live weight gains (DLWG) of male and female calves fed with good quality colostrum (colostrum specific gravity > 1.045 g/ml) during the drinking period of 0-56 days were determined as 0.476±0.03 and 0.470±0.04 kg, and these values were changed as 0.506±0.04 and 0.374±0.04 kg, respectively, with medium quality colostrum (colostrum specific gravity 1.035-1.045 g/ml). In another study (Kaygısız and Köse, 2007), it was determined that the quality of colostrum did not affect the growth characteristics of the calves.

The calves are born undefended against to the environment because of placental structure of their mothers. For this reason, calf keeping conditions are highly important for healthy development and growth of the calves. Calves in dairy farms are generally kept in individual hutches or groups. Tapki (2007), investigated the effect of barning system on the calves, found that the total live weight gain (TLWG) in the 63rd day was 30.69 kg in the individual hutches whereas 33.87 kg in the grouped calves. Dogan (2014) estimated live weight (LW), withers height (WH), chest girth (CG), rump height (RH) and body length (BL) measurements of the two month old calves for individuals and groups as 66.29±2.34 kg, 81.24±1.17, 100.53±1.78, 88.00±1.47 and 91.34±3.46 cm; 67.85±2.55 kg, 82.02±1.27, 99.78±1.94, 90.15±1.60 and 97.31±3.76 cm, respectively. Morever, the authors informed that barning conditions were not effective on the growth performance of calves. Shortly, non-genetic factors affecting colostrum quality and the associations of barning types with growth traits of calves are still argument. Revealing these effects will present important profits for dairy farmers.

The objectives of this study were to investigate the non-genetic factors affecting colostrum quality, and to reveal the effect of colostrum quality and barning conditions on the growth characteristics of Holstein calves.

MATERIALS AND METHODS

In this study, colostrum collected from Holstein cows reared at seven farms enrolled to Konya Livestock Cattle Breeders Association and the calves of these cows were used. In total, 61 cows and their calves (38 male and 23 female) were evaluated.

The calves chosen as the experiment material were dried by their mothers about 1 hour after birth, then seperated from mothers after septicemia vaccinations and umblical cord disinfection procedures performing. Depending on the breeding conditions of the enterprises, some of them were barned in individual hutches and also some of them were kept in the groups.

No milk drinking program was applied during the period of colostrum and milk suckling periods. A total of 5 liters of milk were drunk each day during trial the calves in each enterprises, with 2.5 liters of milk each morning and evening. After birth, ad libitum water, calf starter from the first week of the calf and alfalfa dry grass in good quality from the 10th day were given. Throughout the trial, calves with various health problems such as diarrhea and respiratory system infection were removed from the experiment.

The date of birth of the calves born from the beginning of the experiment, the mother ear number was recorded, and after birth, 2nd 24th, 48th and 72nd h, about 0.5 liters of colostrum samples were taken and stored as frozen in the deep freeze (approximately -18 °C) in the refrigerators. At the sampling, colostrum samples were taken by mixing the total colostrum homogeneously after the milking process was completed. The colostrometer was used to determine the quality of the colostrum by determining the relationship between the amount of immunglobulin and specific gravity. Colostrum samples for quality analysis were applied in laboratory. For this aim, the samples were heated to 20-22 ^{o}C in hot water bath.

After birth, LW, CG, RH, WH, BL, Chest Widht (CW) and Chest Depth (CD) of the calves measurements were taken at 15th, 30th, 45th, 60th days. Electronic weighing, measuring stick and tape were used in the measurements process. The calves were fed only with colostrum that taken from their mothers.

Colostrum intensities during sampling periods were analyzed by groups according to parity and season of calving. For parity, cows were classified in the 1., 2., 3., 4≤. lactation groups and, for calving season, three groups were formed as winter, spring and fall. Due to no enough calves in the evaluated herds during the summer period, calves born in this season were not included in the experiment. For colostrum quality, three groups were formed based on the first colostrum quality immediately after birth. For this purpose, groups were designed as follows: 1st group: ≤1.050gr/ml, 2nd group: 1.051-1.060gr/ml and 3rd group: 1.060< gr/ml. The calf growths were grouped in terms

of colostrum quality groups and barning systems and, the effects of these factors were investigated by using variance analysis technique. The following mathematical models were applied:
For colostrum quality;

$$Y_{ijk}=\mu+a_i+b_{j+}+e_{ijk} \quad (2.1)$$

Where, Y_{ijk}: i. birth season, j. colostrum quality of parity, μ: population average, a_i: i. effect of the calving season (i= winter, spring, fall), b_j: j. effect of the parity (j=1, 2, 3, 4≤), e_{ijk}: random residual term.

For growth of the calves;

$$Y_{ij}=\mu+a_i+e_{ij} \quad (2.2)$$

Where, Y_{ij}: i. consuming colostrum in quality, j. growth of the calves in barning system, μ: population average, a_i: i.effect of the colostrum quality (k= 1, 2, 3), and e_{ij}: random residual term.

The variation of colostrum density according to calving season and parity and the growth characteristics according to change colostrum quality class were determined by One-way ANOVA. In addition, due to two different types of barning, the effect of the barning type on growth characteristics was examined by t-test. In the all statistical works, SPSS 20.0 for Windows package program licensed by Ondokuz Mayıs University was used.

FINDINGS AND DISCUSSION

In this study, mean colostrum specific gravity values produced at birth, 24th, 48th and 72nd were found as 1.058±0.0013, 1.042±0.0012, 1.031±0.0007 ve 1.027±0.0004 g/ml respectively (Table 1). In the similar studies, the mean specific gravity of the colostrums taken within the first 24 hours after birth were determined between 1.043±0.0013 g/ml and 1.063.90±0.0167g/ml (Kaygısız and Köse; Göncü et al., 2013). Our findings were found as similar with the first number and the values determined in the second study was considerably higher than means obtained in the present study. In the study conducted by Kume and Tarabe (1993), the specific gravity of the first colostrum belonging 2 hours after birth were found to be 1.059 g/ml, 1.066 g/ml, 1.070 g/ml ve 1.064g/ml in the cows with 1th, 2nd, 3th and 4th lactation, respectively. But, these values were determined to be 1.054 g/ml, 1.063 g/ml, 1.058 g/ml ve 1.060g/ml in this study. The differences in the studies might be caused by the variation by herd management or feeding conditions of dairy farms.

Table 1. Variation of colostrum specific gravity in different periods according to parity and calving season (g/ml)

Parity	Birth		24 h		48 h		72 h	
	n	Mean±SE	n	Mean±SE	n	Mean±SE	n	Mean±SE
1	16	1.054±0.0028	14	1.040±0.0017	12	1.031±0.0015	13	1.026±0.0007
2	7	1.063±0.0033	7	1.044±0.0052	7	1.032±0.0020	7	1.026±0.0007
3	16	1.058±0.0028	16	1.040±0.0021	16	1.030±0.0011	15	1.027±0.0006
4≤	19	1.060±0.0023	19	1.043±0.0022	18	1.032±0.0013	17	1.027±0.0008
CS	n	Mean±SE	n	Mean±SE	n	Mean±SE	n	Mean±SE
Winter	13	1.064±0.0020	13	1.040±0.0029	12	1.030±0.0013	12	1.026±0.0005
Fall	16	1.055±0.0027	16	1.041±0.0028	16	1.031±0.0013	16	1.027±0.0007
Spring	29	1.057±0.0019	27	1.043±0.0014	25	1.032±0.0010	24	1.027±0.0006
Mean	58	1.058±0.0013	56	1.042±0.0012	53	1.031±0.0007	52	1.027±0.0004

CS: calving season

As seen in Table 1 and Figure 1, colostrum specfic gravity decreased rapidly but Ig content decreased. This case shows the importance of the first sucking time after birth to reach sufficient colostrum intensity.

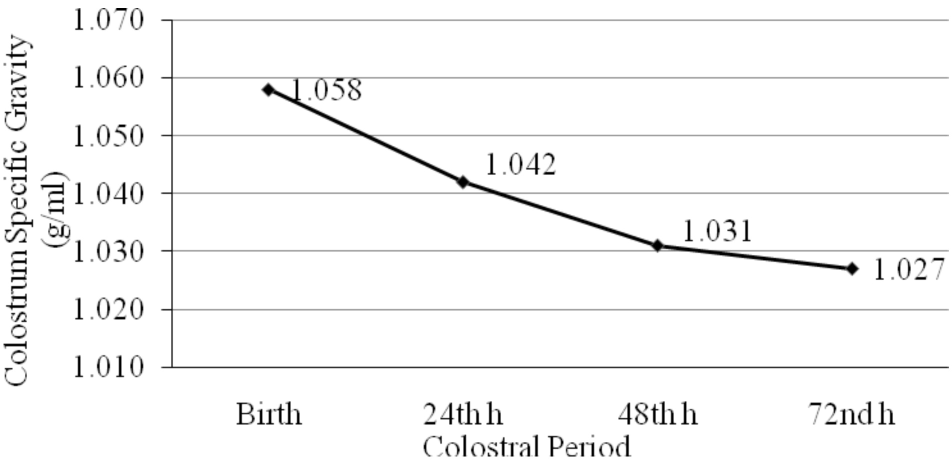
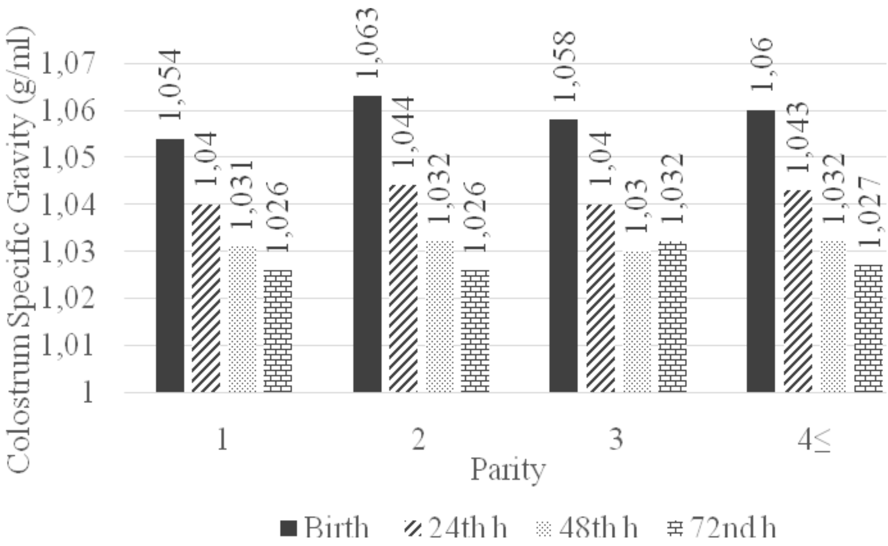


Figure 1. Change of colostrum specific gravity according to colostrum periods

In the study, it was determined that the parity and the calving season did not affect the colostrum concentration, and both environmental factors did not change the colostrum quality statistically. The effect of parity on colostrum quality was also found to be insignificant by Kaygsiz and Köse (2007) and Genc (2015), whereas Gulliksen et al. (2008), Zarcula (2010), Morrill et al. (2012) and Göncü et al. (2013) informed as statistically significant. In a study conducted by Kume and Tarabe (1993), the specific gravity of the first colostrum taken within 2 hours after birth were found to be 1059 g/ml, 1066 g/ml, 1070 g/ml and 1064 g/ml in the cows with 1th, 2nd, 3th and 4th parity, respectively, but these levels were calculated as 1054 g/ml, 1063 g/ml, 1058 g/ml ve 1060 g/ml in this study. The results of this study differed from the results of studies reported by Kume and Tanabe (1993) and Göncü et al. (2013). In contrary to many literature data, the results obtained in this study suggest that the parity and calving season did not change the colostrum specific gravity and these differences might be caused by different number of samples for each lactation and season.



Figüre 2. Change of colostrum specific gravity of cows in different parity according to colostrum periods.

Unlike the results obtained in this study, Morin et al. (2001) found that colostrum intensities of cows calved in the fall had higher than cows calved in summer, and also, Gulliksen et al. (2008) reported that the winter results were lower than the other seasons. In this study, the density of colostrum produced by cows calved in the winter months were higher than those obtained in the other seasons, but this difference was not statistically significant (Table 1). In addition, the variation in density of the colostrum for each sampling periods by examined seasons is seen in the Figure 3.

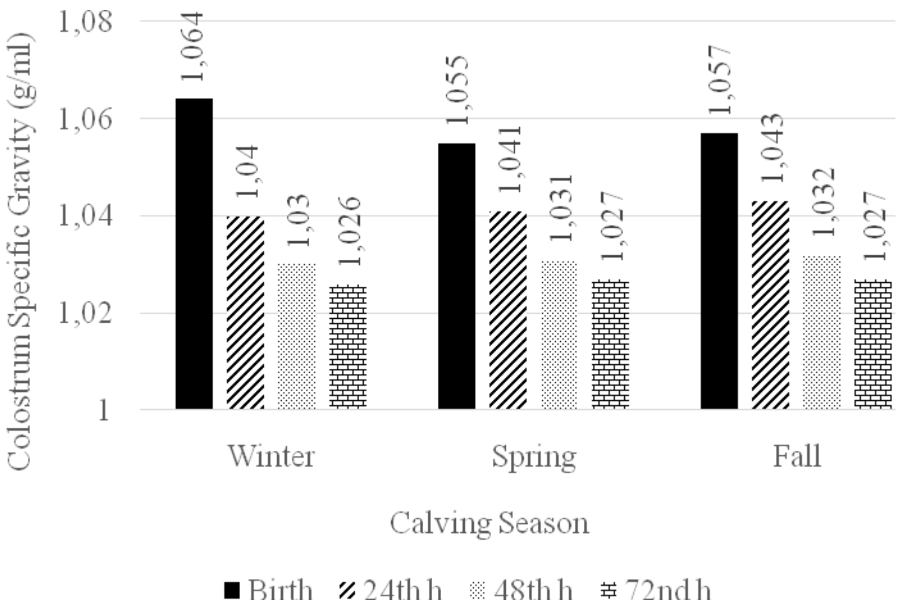


Figure 3. Change of colostrum density during the colostrum period by calving seasons

In this study, colostrum taken until the second hour after birth of the cows was classified in three groups according to their specific gravity. The live weights and body measurements at 15 ± 3, 30 ± 3, 45 ± 3 and 60 ± 3 days of the calves fed different levels of colostrum classified by their specific gravity are presented in Table 2. Mean values of LW, CG, WH, CW, CD, RH and BL for 15th and 30th d age of calves were determined as 50.0±0.74 kg, 81.7±0.43, 75.0±0.37, 21.4±0.25, 28.5±0.28, 79.8±0.41 and 73.2±0.57 cm; 56.4±0.89 kg, 85.0±0.44, 77.4±0.45, 22.4±0.25, 30.3±0.26, 82.7±0.42 and 76.2±0.57 cm respectively. The values of LW, CG, WH, CD and BL were higher than the values determined by Yüceer and Özbeyaz (2010) from calves with 30th d. Similarly, the values fort he growth characteristics in 45th and 60th day periods of the calves were in agreement with the findings reported by Tapki et al. (2006) and Yüceer and Özbeyaz (2010).

In the study, the effect of colostrum quality produced on the 2nd hour after birth on the live weight and body measurements at 15th, 30th, 45th and 60th days was statistically insignificant. Actually, the drinking time of the colostrum is limited for a few days, and due to the most important effect of colostrum to the formation of immunity is very high. At this point, a direct effect of colostrum on the growth within the period of the study might not be clear. As known, sufficient level of immunity protects the microbes against the microbial risks as well as reduces the factors that can adversely affect growth. Thus, it could be concluded that the protection effect against microbial effects in all of the calves had been achieved sufficiently. In other words, no factors that may adversely affect growth performance was remarkable in this study. Besides, nutritive effect did not make any difference in the growth of the calves in all periods of measurement. In contrast, a similar study by Göncü et al. (2014) emphasized that the quality of colostrum had a positive effect on calf growth performance after weaning.

In the investigation, the effects of the barning system on the growth performance are showns in the Table 3. As seen, LW (P<0.05) and CW (P <0.01) higher in calves barned in the individual hutches at 15-day-age period. It was determined that effect of barning type on the growth performances at 30 days of age was not significant, but the LW, CG, WH and CW averages of the

45th day of calves breeding in invidual hutches were found better than grouped ones ($P<0.05$). The similar case was also observed in the 60th day measurement values, and the mean LW of the 60th day of the calves kept in the individual hutches was found as 77.48±1.581 kg and the mean of the calves barned as group was 71.98±1.800 kg ($P<0.05$). In this period, while the barning system of calves was effective on LW, CG and RH ($P<0.05$), the effect on WH was determined statistically significant ($P<0.01$; Table 3). It is possible to explain that the calves in individual hutches had more beneficiated from milk and feed and, shown better growth performance due to consumed feed in the sufficient level. In contrast, Tapkı (2007) determined that the growth performance of 60-day-age calves kept in individual hutches was lower than that of grouped ones ($P<0.05$). Morever, Dogan (2014) emphasized that the effect on the LW, CG, RH and BL values is not significant in terms of barning style.

In this study, LWG (6.81±0.478 kg) at 0-15 day age was found to be higher in calves barned in the individual hutches than grouped ones (4.58±0.482 kg) ($P<0.01$) (Table 4). In the 15-30, 30-45 and 45-60 days of age, the LWG of the individual calves was not found to be statistically different from the grouped ones. It was determined that the total number of LWG and daily LWG in the individual hutches were higher in the 0-60 day age calves than in the grouped ones ($P<0.05$). However, unlike this study, Tapki (2007) found that LWG of group barned calves was higher in 4-63 days. Total LWG of the calves barned in the individual hutches at 0-60 day age was 33.27±1.195 kg and this mean was 29.05±1.481 kg for calves barned as group. In this period, DLWG was also determined as 0.555±0.0199 kg and 0.484±0.0247 kg, respectively, for individual and group barned calves. Bayril et al. (2015) determined the mean DLWG of female and male calves as 0.540 and 0.572 kg, respectively. These values might be assumed as similar to the results obtained in this study. Besides, mean DLWG was calculated to be 0.528 kg at 0-60 day age of the calves in our study, 0.564 kg was reported by Eivazi et al. (2013). Firstly, different farm or location conditions migh be assumed as the main reasons of these variations among the similar investigations at this point.

Table 2. Live weights and body measurements of different age periods by colostrum groups

Period	Col. Group	n	LW (kg)	CG (cm)	WH (cm)	CW (cm)	CD (cm)	RH (cm)	BL (cm)
15 days		n	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
	1	15	49.8±1.42	81.3±0.86	75.6±0.61	21.9±0.38	29.3±0.62	80.5±0.61	73.9±0.77
	2	17	50.3±1.45	81.8±0.83	74.0±0.77	21.3±0.53	28.2±0.44	79.1±0.94	73.5±1.28
	3	26	50.0±1.12	81.8±0.64	75.3±0.53	21.2±0.39	28.3±0.43	79.9±0.57	72.7±0.85
	Mean	58	50.0±0.74	81.7±0.43	75.0±0.37	21.4±0.25	28.5±0.28	79.8±0.41	73.2±0.57
30 days		n	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
	1	14	54.9±1.83	84.1±0.87	77.1±0.72	22.8±0.33	31.1±0.32	82.5±0.64	76.5±1.21
	2	14	56.9±1.92	85.4±0.94	76.9±1.03	22.1±0.53	29.6±0.51	82.4±0.92	76.2±1.10
	3	24	56.9±1.18	85.3±0.62	77.8±0.67	22.3±0.41	30.3±0.41	83.0±0.65	76.0±0.81
	Mean	52	56.4±0.89	85.0±0.44	77.4±0.45	22.4±0.25	30.3±0.26	82.7±0.42	76.2±0.57
45 days		n	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
	1	12	63.1±2.47	88.2±1.15	79.5±0.62	24.1±0.53	32.3±0.49	84.7±0.95	81.0±1.17
	2	14	66.2±2.27	89.6±1.11	79.5±0.90	23.3±0.49	31.6±0.55	84.7±0.82	80.4±1.30
	3	22	65.7±1.55	89.3±0.71	80.5±0.72	23.6±0.40	32.3±0.54	85.8±0.68	79.7±0.85
	Mean	48	65.17±1.14	89.1±0.54	79.9±0.45	23.6±0.26	32.1±0.32	85.2±0.47	80.3±0.61
60 days		n	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
	1	11	75.8±2.69	92.6±1.40	83.0±0.86	25.5±0.61	33.8±0.59	88.4±0.82	85.3±1.18
	2	14	76.3±2.35	94.0±1.02	82.0±0.91	25.2±0.45	33.6±0.67	87.6±0.72	83.3±1.05
	3	21	75.2±1.92	93.4±0.79	83.1±0.73	25.1±0.48	34.5±0.54	88.4±0.63	84.2±0.77
	Mean	46	75.7±1.27	93.4±0.57	82.7±0.48	25.2±0.29	34.0±0.35	88.1±0.41	84.2±0.55

LW: Live Weight; CG: Chest Girth; WH: Withers Height; CW: Chest Widht; CD: Chest Depht; RH: Rump Height; BL: Body Lengh; Col. Group: 1=≤1.050 mg/ml; 2= 1.051-1.060 mg/ml; 3= 1.060< mg/ml.

Table 3. Influence of the calf barning type on growth performance

Period	Housing System	n	LW(kg)	CG (cm)	WH (cm)	CW (cm)	CD (cm)	RH(cm)	BL (cm)
			Mean±SE *	Mean±SE	Mean±SE	Mean±SE **	Mean±SE	Mean±SE	Mean±SE
15 days	Group	22	47.82±0.991	80.68±0.604	74.59±0.584	20.50±0.404	27.82±0.393	79.23±0.677	71.86±1.043
	Individual	39	51.04±0.981	82.13±0.550	74.95±0.483	21.92±0.271	28.90±0.346	79.85±0.550	73.90±0.589
	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
			Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE	Mean±SE
30 days	Group	21	54.45±1.202	84.00±0.617	76.57±0.664	21.86±0.443	29.81±0.461	81.95±0.681	75.67±0.962
	Individual	34	57.31±1.190	85.50±0.587	77.68±0.592	22.68±0.279	30.65±0.276	82.79±0.582	76.50±0.668
	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
			Mean±SE *	Mean±SE *	Mean±SE *	Mean±SE *	Mean±SE	Mean±SE	Mean±SE
45 days	Group	20	62.10±1.661	87.65±0.822	78.75±0.640	22.95±0.413	31.40±0.520	84.40±0.799	79.85±0.982
	Individual	31	66.81±1.404	89.87±0.642	80.52±0.558	24.06±0.300	32.55±0.353	85.52±0.533	80.32±0.750
	Mean	52	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
			Mean±SE *	Mean±SE *	Mean±SE **	Mean±SE	Mean±SE	Mean±SE *	Mean±SE
60 days	Group	18	71.98±1.800	91.68±0.915	80.89±0.639	24.47±0.421	33.21±0.538	86.89±0.666	83,68±0.817
	Individual	30	77.48±1.581	94.30±0.651	83.83±0.591	25.57±0.348	34.50±0.395	88.87±0.495	84,37±0.686
	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

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

Table 4. Live weight gains in different periods by barning type

Barning type	Live Weight Gain (kg)					
	0-15 days	15-30 days	30-45 days	45-60 days	Birth-60 days	Birth-60 days[1]
	Mean±SE **	Mean±SE	Mean±SE	Mean±SE	Mean±SE *	Mean±SE *
Group	4.58±0.482	6.68±0.612	7.76±0.636	9.61±0.643	29.05±1.481	0.484±0.0247
Individual	6.81±0.478	6.71±0.521	8.73±0.425	10.39±0.501	33.27±1.195	0.555±0.0199
Overall	6.01±0.376	6.70±0.395	8.35±0.362	10.10±0.395	31.69±0.968	0.528±0.0161

*P<0.05; ** P<0.01; 1: DLWG

RESULTS

Finally, the quality of the colostrum decreased rapidly from the second postpartum hour to the 72nd hour postpartum. Really, feeding colostrum to a calf immediately after birth is a gold approach to achieve sufficient passive immunity. In the study, the quality of the colostrum produced by Holstein cows after birth did not differ on the growth performance of the calves. The fact that weak concentration of colostrum can not supply adequate passive immunity of newborn calves in the early stages of their life. Moreover, this case significantly contributes survival rate of the calves. In the study, it was concluded that the system of barning during the milk suckling had an effect on the calf growth performance and, the individual-housed calves showed better growth performance than the grouped ones by total and daily live weight gains. These results obtained here might mainly be caused by the consumption of sufficient milk and feed, as well as the prevention of contact with each other and the lower risk of infection the individual feeding of the calves in the individual hutches when compared to the calned barned in the groups. For this reason, keeping calves as individual in the suckling period may be recommeded as an effective method to boost performance of calf growth and to reduce calf losses in dairy enterprises.

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