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Managerial Practices Related to The Survival of Calves in Dairy Cattle Breeding Farms in Hendek District-I[A]

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Abstract: This research was conducted out to determine the knowledge, ideas and behaviors related to the managerial practices of calf's survival in dairy cattle farms in Hendek district of Sakarya province, and to analyze the status of the existing farms. In the research, were identified farms which are registered to Turkvet and e-breeding system database having ten or more dairy cattle in Hendek district. Random sampling method was used to determine the sample size. The identified farms are divided into five class which are 10-20 heads, 21-30 heads, 31-40 heads, 41-50 heads and over 50 heads of cattle. In this context, after obtaining general data about the farms, questions related to the main topics about the care and management of calves such as colostrum use, feeding practices, health protection and housing were evaluated. In feeding management, farms with a capacity of 40 heads and less prefer grazing and supplementary feeding, while farms with a capacity of 40 heads and above prefer to feed in barns (P<0.05). While 74% of all farms have an annual average milk yield of less than 5000 liters, 26% yield more than 5000 liters (P<0.05). 15.6% of the farms produce less than five calves, 33.8% 6-10 calves, 28% 11-20 calves, and 22.5% have 20 or more calves (P<0.05). In 70.5% of the farms, calf losses occur within the first 30 days, followed by a decrease in deaths in the following weeks. While the answer to the question of separating the calves from their mothers after birth comes to the forefront in small-scale farms, the approach to separate them immediately or within the first 12 hours becomes prominent as the farm capacity increases (P<0.05). It was determined that approximately 77% of the farms did not have such an approach to

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[A] Ethics committee approval was obtained with the decision letter of Bursa Uludağ University Research and Publication Ethics Committee dated 31.01.2022 and numbered 7 of the 2022-01 session.
Research and Publication Ethics were followed in this study.

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determine the quality of the colostrum given to the calves, and it was determined that quality assessments were made as the farm capacity increased (P<0.05).

Keywords: Calf, survival, welfare, colostrum, herd size, herd management.

Hendek İlçesi Süt Sığırcılığı İşletmelerinde Buzağılarda Yaşama Gücü İle İlgili Yönetsel Uygulamalar- I

Öz: Bu araştırma Sakarya ili Hendek ilçesi süt sığırcılığı işletmelerindeki buzağılarda yaşama gücü ile ilişkili yönetsel uygulamalar konusunda bilgi, fikir ve davranışları belirlemek amacıyla yürütülmüştür. Araştırmada Türkvet ve e-ıslah sistemi veri tabanına kayıtlı Hendek ilçesindeki 10 baş ve üzeri süt sığırı varlığına sahip işletmeler belirlenmiştir. Örnek büyüklüğünün belirlenmesinde tesadüfi örnekleme yöntemi kullanılmıştır. Belirlenen işletmeler 10-20, 21-30, 31-40, 41-50 ve 50 baş üzeri sığır varlığına sahip olan işletmeler olmak üzere 5 gruba ayrılmıştır. Bu kapsamda işletme ile ilgili genel veriler alındıktan sonra buzağıların bakım ve yönetimine yönelik olarak kolostrum kullanımı, besleme uygulamaları, sağlık koruma ve barındırma gibi temel konu başlıklarına yönelik sorular değerlendirilmiştir. İşletmelerde hayvan varlığı arttıkça yerli ırkların yerini kültür ırkı ve melezlerinin aldığı görülmektedir. Sığırların beslenme yönetimi, 40 baş ve altı kapasiteye sahip olanların otlatma ve ek yemlemeyi şeklini tercih ederken, 40 baş üzeri kapasiteye sahip olanlar ahırda beslemeyi tercih etmektedir (P<0.05). Tüm işletmelerin %74'ünde yıllık ortalama 5000 litreden daha az süt verimi elde edilirken, %26'sı ise 5000 litreden fazla üretim yapmaktadır (P<0.05). İşletmelerin %15.6'sı yılda 5 adetten az, %33.8'i 6-10 adet, %28'i 11-20 adet ve %22.5'i de 20 baş ve üzeri buzağı elde etmektedir (P<0.05). İşletmelerin %70.5'inde buzağı kayıpları ilk 30 gün içerisinde gerçekleşmekte, ilerleyen haftalarda ölümler azalmaktadır. Buzağıların doğumdan sonra analarından ayrılması sorusuna, küçük ölçekli işletmelerde yanında tutarım cevabı öne çıkarken, işletme kapasitesi artıkça derhal veya ilk 12 saat içinde ayırırım yaklaşımı öne çıkmaktadır (P<0.05). Buzağılara verilen kolostrumun kalitesinin belirlenmesine yönelik olarak işletmelerin yaklaşık %77'inde böyle bir yaklaşımın olmadığı, işletme kapasitesi artıkça kaliteye yönelik değerlendirmelerin yapıldığı belirlenmiştir (P<0.05).

Anahtar Kelimeler: Buzağı, yaşama gücü, refah, kolostrum, sürü büyüklüğü, sürü yönetimi.

Introduction

Sustainability in the activities of livestock farms is the continuation of continuity and efficiency in production. In beef cattle, those that have completed their economic life are removed from the herd in accordance with market conditions, but the situation is different in dairy cattle (Mumdan and Karabulut, 2008). In dairy cattle farms, it is

aimed to obtain one calf from one cow per year for profitability, 60% of the income is milk, and 40% is the number of calves obtained. However, the profitability and continuity of a dairy farm are essential for the number of calves obtained from a cow in that herd in a year and for the calves to be raised appropriately and at a low cost and included in production. Although calf losses vary between 2-12% in farms, 4% is considered normal. Calf losses are among the critical problems of cattle breeding in the world, and in the prevalence studies, this value is 25% in Italy (De Amicis, 2017) and 2.47-7.42% in England (Gates, 2013), and 6.4% in the USA (Anonymous, 2007). Although it differs according to regions and farms in Turkey, there is an average of 10-15% calf losses (Aydınoğlu and Köse, 2018).

Animals that are removed from the herd for various reasons, voluntarily or involuntarily, should be replaced by healthy young animals with high yield potential. The health of these animals can only be possible with good calf care management. Care management practices followed during the calf's development period are an essential indicator of its future reproductive performance. With the genotypic improvement in animals, advances in feeding management, and increased lactation efficiency, calf feeding and management have begun to be given importance. The calf is the main strength of dairy cattle farms; its proper nutrition and management will directly affect the herd's future performance and the farms profitability. The creation of conditions that enable calves to become high-yielding substitute cattle from birth affects their chances of being able to replace barren, old, and low-yielding cattle in the future. It is inevitable that the calves, faced with care and feeding errors in the months following the birth, will experience problems in their milk and reproductive performance or fattening performance in the future. Different welfare assessment systems are proposed to reduce mortality and improve rearing conditions in calves. European Food Safety has developed a risk analysis approach for animal welfare and has set a criterion for the welfare of calves, especially in intensive farming systems (Efsa, 2006). Critical hazards to the welfare of the calves and the possibility of exposure of the animals to them are evaluated. The survival of the calves in the first days after birth depends on the proper intake of quality colostrum (Godden 2008).

In Turkey, an average of 4.5 million calves are born annually, and 15% of the calves die. It is known that the deaths of the calves are not a destiny, and they generally occur due to inadequate care conditions, ignorance, and negligence. When necessary steps are taken in this direction, deaths will be minimized, and the country's resources will be prevented from being wasted (Yıldırım, 2017). For the income of the farms and the efficiency of the herd, a welfare environment suitable for all care-feeding criteria should be provided to increase the viability of the calves after birth.

The factors that cause calf death in the farms should be determined, and this situation should be eliminated with managerial measures. This study aimed to reveal the conditions of colostrum (colostrum), nutrition, health protection, housing, and general herd management in calves in farms grouped according to their animal capacities.

Material and Method

The material of this study consisted of farms that carried out dairy cattle production registered in the database of Türkvet and the e-Islah system in 2018 in the Hendek district of Sakarya. The data obtained from the voluntary face-to-face survey conducted with the owners of the farms with ten or more animals and within the scope of administrative practices to increase calf losses and survival were evaluated. Ethics committee approval was obtained with the decision letter of Bursa Uludağ University Research and Publication Ethics Committee dated 31.01.2022 and numbered 7 of the 2022-01 session.

A stratified sampling method was used to determine the sample size of the study. In the stratified sampling method, for each trait taken from a population, it is determined that the subgroups of the population are stratified in proportion to their size (Kavuncu, 2019). The number of villages and farms determined by this method was chosen randomly. The selected farms are divided into five groups according to their size. In the stratification process, attention was paid to the fact that each farms belongs to the group (stratum) to which it belongs.

The research determined farms with ten or more dairy cattle registered in the Turkvet and e-Islah system database in the Hendek district of Sakarya province. It has been determined that there are 593 dairy cattle farms in the determined number of villages and farms selected randomly. A 10% margin of error and 95% confidence limits were considered in determining the sample volume. The farms that make up the population are divided into five groups (10-20 heads, 21-30 heads, 31-40 heads, 41-50 heads, and 50+ heads), considering the distribution of the number of dairy cattle. The study did not include farms with a cattle presence of 10 heads or less. Following formula were used to determine the sample size;

$$n = N.s^2 / (N-1)* D^2 + s^2 \quad (1)$$

n: Sample size

N: the number of farms that make up the population

s: variance shown by farms

D^2: d^2/z^2

d: the margin of error of the difference between the sample mean and the population mean

z: z value in the standard normal distribution table according to the accepted error rate

Table 1. Sample size of the population in Hendek district

N	t	t^2	S^2	d	d^2	n
593	1.96	3.84	864.45	2	4	159

The sample size to be selected from 593 farms in the Hendek district was calculated as 159. First, the strata ratios were found, then the strata's sample sizes (n) were calculated by multiplying each stratum by these ratios

(Table 2). However, due to the small number of existing large-capacity farms, the number of farms in the 10-20 layer has been reduced, and the number of other layers has been increased as much as possible.

Table 2. Number of farms visited by farm size

	Groups	The calculated number of farms	Number of farms visited
Farm capacity (head)	10- 20	115	69
	21-30	28	36
	31-40	8	25
	41-50	5	14
	>50	5	16
	Total	159	160

The main points determined for the survey; General data about the farms are listed as colostrum, feeding, health, and housing. The forms obtained at the end of the survey application were processed into the Google forms program and transferred to Microsoft Excel. Numeric (frequency) and proportional values were calculated for the answers given to each question in the questionnaire form, and tables were prepared. The differences of the responses in terms of farm sizes were tested with the Chi-Square Analysis (Minitab 2014).

Results and Discussion

In the research, the villages where the randomly determined farms are located are classified under three sub-headings: mountain, lowland, and center. According to Table 3, it is seen that a significant part of the holdings operates in the lowland villages, while those with 10-20 cattle, which can be considered as small-scale, are located in the mountain villages. There are farms with a larger capacity of ≥50 cattle in the towns close to the center.

Table 3. Distribution of farms by location of villages

	Criteria	Mountain		Lowland		Center	
		N	%	N	%	N	%
Farm capacity (head)	10-20	23	33.3	46	66.7	0	0.0
	21-30	6	16.7	29	80.6	1	2.8
	31-40	4	16.0	19	76.0	2	8.0
	41-50	3	21.4	10	71.4	1	7.1
	>50	2	12.5	12	75.0	2	12.5
	Total	38	23.8	116	72.5	6	3.7

When the cattle breeds raised to the size of the farm are evaluated, it is seen that the foreign breeds and crosses replace the native breeds as the capacity increases (Table 4). Holstein, Simmental purebreds, and crossbreds stand out as foreign breeds.

Table 4. Genotypic distribution of cattle in farms

Criteria		Native		Foreign		Foreign and native		Foreign and crossbred	
		N	%	N	%	N	%	N	%
Farm capacity (head)	10-20	6	8.7	41	59.4	7	10.1	15	21.7
	21-30	2	5.6	24	66.7	4	11.1	6	16.7
	31-40	2	8.0	16	64.0	3	12.0	4	16.0
	41-50	0	0.0	10	71.4	2	14.3	2	14.3
	>50	0	0.0	13	81.3	1	6.3	2	12.5
	Total	10	6.3	104	65.0	17	10.6	29	18.1

The shelter systems in the farms were evaluated in three groups tied-stall, free-stall, and pasture-raising. It was determined that 51% of them used the free-stall barn type (Table 5). A comparison of farm size and barn structure was found significant (P<0.05).

Table 5. Types of shelters used in farms

Criteria		Tied-stall		Free-stall		Pasture	
		N	%	N	%	N	%
Farm capacity (head)	10-20[b]	26	37.9	38	55.1	5	7.3
	21-30[b]	9	25.0	24	66.7	3	8.3
	31-40[b]	14	56.0	11	44.0	0	0.0
	41-50[b]	9	64.3	5	35.7	0	0.0
	>50[a]	12	75.0	4	25.0	0	0.0
	Total	70	43.8	82	51.2	8	5.0

$\chi 2$ <0.05

The nutritional management of the cattle in the farms, grazing and supplementary feeding in those with a capacity of 40 heads and below, and the farms have 40 cattle prefer to feed in the barn. It should not be forgotten that the geographical conditions of the farms are effective in this (Table 6). As the holding capacity grows, the genotypic composition of the existing cattle and conventional feeding based on increased feed intake come to the fore, increasing milk yield. The difference between herd diet and farm sizes is significant (P<0.05). A similar study was conducted in Austria, and it is stated that in the existing farms participating in the study, feeding patterns are in the barn (76.1%) and grazing (23.9%) (Klein-Jobstl et al. 2015).

Table 6. Nutritional management of animals

Criteria		Barn		Grazing		Grazing + supplementary feeding	
		N	%	N	%	N	%
Farm capacity (head)	10-20[c]	5	7.2	13	18.8	51	73.9
	21-30[c]	0	0.0	6	16.7	30	83.3
	31-40[c]	3	12.0	1	4.0	21	84.0
	41-50[a]	11	78.6	0	0.0	3	21.4
	>50[b]	11	68.8	0	0.0	5	31.3
	Total	30	18.8	20	12.5	110	68.7

$\chi 2$ <0.05

Lactation milk yield is directly related to the genetic structure and nutritional management of the herd. Operating capacity is one of the main determining factors. The average daily milk yield is less than 10 liters (Table 7) in farms that have 30 heads or less of cattle. The difference between the average milk yield of the lactating cattle and the farm size was significant (P<0.05).

Table 7. Average daily milk yield of lactating cattle (liter)

	Criteria	<10		11-15		>16	
		N	%	N	%	N	%
Farm capacity (head)	10-20[e]	49	71.0	12	17.4	8	11.6
	21-30[d]	18	50.0	14	38.4	4	11.1
	31-40[c]	6	24.0	9	36.0	10	40.0
	41-50[b]	0	0.0	4	28.6	10	71.4
	>50[a]	0	0.0	3	18.8	13	81.3
	Total	73	45.6	42	26.3	45	28.1

$\chi 2$ <0.05

According to Table 8, the number of cattle in lactation is more than 15 heads in all farms over 40 heads. All cattle in lactation from the 10-20 head farms belong to the <15 head group. The statistical difference between the number of lactation cattle and the size of the holdings is significant (P<0.05).

Table 8. Number of cattle in lactation (head)

	Criteria	< 15		16-30		> 31	
		N	%	N	%	N	%
Farm capacity (head)	10-20[b]	69	100.0	0	0.0	0	0.0
	21-30[c]	26	72.2	10	27.8	0	0.0
	31-40[d]	4	16.0	20	80.0	1	4.0
	41-50[e]	0	0.0	9	64.3	5	35.7
	> 50[a]	0	0.0	5	31.3	11	68.7
	Total	99	61.9	44	27.5	17	10.6

$\chi 2$ <0.05

An average of 74% of all evaluated farms produce less than 5000 liters of milk, and 26% have more than 5000 liters of milk annually (Table 9). The effect of the size of the farm on the annual average milk yield of the cattle in the farm is significant (P<0.05).

Table 9. Annual average milk yield of farms (liter)

	Criteria	< 5000		>5000	
		N	%	N	%
Farm capacity (head)	10-20[d]	66	95.7	3	4.3
	21-30[d]	35	97.2	1	2.8
	31-40[c]	14	56.0	11	44.0
	41-50[b]	3	21.4	11	78.6
	> 50[a]	1	6.3	15	93.8
	Total	119	74.4	41	25.6

$\chi 2$ <0.05

Commercial success in cattle breeding is to have at least one calf per year for every cattle. According to the research results, 15.6% of the farms have less than five calves per year, 33.8% have 6-10 calves, 28% have 11-20 calves, and 22.5% have 20 or more calves per year. (Table 10). The number of calves obtained in a year in the farms is important according to the size of the farm ($P<0.05$).

Table 10. Number of calves obtained annually by farm size (head)

		≤ 5		6-10		11-20		≥ 21	
	Criteria	N	%	N	%	N	%	N	%
Farm capacity (head)	10-20[a]	22	31.9	43	62.3	4	5.8	0	0.0
	21-30[b]	1	2.8	11	30.6	22	61.1	2	5.6
	31-40[c]	1	4.0	0	0.0	16	64.0	8	32.0
	41-50[d]	0	0.0	0	0.0	2	14.3	12	85.7
	> 50[d]	1	6.3	0	0.0	1	6.3	14	87.5
	Total	25	15.6	54	33.8	45	28.1	36	22.5

$\chi 2 < 0.05$

Generally, the critical period for calves is the first two weeks with a high prevalence of septicemia and enteritis (Radostits, 1997), but in this study, it was evaluated as the first 30 days, and this period was found to have the highest mortality rates (Table 11). Because calf losses are linked to management practices, when calves are partially protected by colostrum with or without the mother, the risk of death continues when they face malnutrition and unsuitable housing conditions. The difference between the number of calves lost yearly, and the farm size is insignificant. In a study conducted in France, it was reported that the mortality rate in the first 24 hours after birth was 1.5% and 6.5% (Bendali et al., 1999), and the rate of calves that died within the first 30 days was 2.17% (Fourichon et al., 1996). In Switzerland, it is stated that the calf mortality rate from birth to weaning is 3.1% (Busato, 1997). As can be seen, when compared to the values found in the farms in the study area, it turns out that the calf losses are at severe levels in Turkey.

Table 11. Number of calves lost (head)

		first 30 days		31-60 days		61-180 days	
	Criteria	N	%	N	%	N	%
Farm capacity (head)	10-20	25	73.5	2	5.9	7	20.6
	21-30	14	60.9	4	17.4	5	21.7
	31-40	21	75.0	7	25.0	0	0.0
	41-50	17	68.0	5	20.0	3	12.0
	> 50	28	71.8	5	12.8	6	15.4
	Total	115	71.9	24	15.0	21	13.1

Birth conditions are of great importance for the health of the newborn calf. Birthing pens should be planned to minimize the stress of birth, ensure the comfort of cattle and newborn calves, and ensure the environment's

hygiene. It has been stated that calving in group divisions is riskier than in individual compartments (Vasseur et al., 2010). According to Table 12, there are many yes answers for the practice of separating the cattle whose birth is approaching in a different pen from the others. Regarding farm size, it is important to distinguish cattle whose birth is approaching from others (P<0.05). It was stated that 5% of the newborn calves died, 55% of the calves that died were in a group pen, and 10% were calves born in a calving pen (Bascom, 2002).

Table 12. Separation of cattle whose birth is approaching from others

Answers		Yes		No	
		N	%	N	%
Farm capacity (head)	10-20[a]	32	46.4	37	53.6
	21-30[c]	23	63.9	13	36.1
	31-40[c]	18	72.0	7	28.0
	41-50[b]	14	100.0	0	0.0
	> 50[c]	15	93.7	1	6.3
	Total	102	63.8	58	36.2

$\chi 2$ <0.05

Immediate separation of the calf from its mother is recommended to reduce the risk of exposure to environmental pathogens (Windsor and Whittington, 2009). It is also essential to facilitate the calf's initial care and colostrum management. Separation of the calf from its mother after birth was found to be significant according to the size of the farms (Table 13) (P<0.05). In a study conducted in Bangladesh, responses were received from farms that were evaluated as follows: I immediately separate the calf after birth (11%), separate it within 24 hours (22%), and keep it for longer than 24 hours or next to it (66%) (Chowdhury et al., 2017), and the results showed similar values with the research group with a capacity of 10-20 heads. In Canada, 73.2% of the holdings reported that the calves were separated from their mothers immediately, and 32.5% within 12 hours. It is stated that 55.9% of existing farms in the USA immediately separate calves from their mothers (Vasseur et al., 2010). Diler et al. (2017) reported that 61% of the farms in Narman district stay with their mothers for more than one week, 26% for three days, and 13% for more than one week.

Table 13. Separation time of calves after birth

	Answers	immediately		< 12 hour		12-24 hour		24-48 hour		48 hour-1 week		I don't separate	
		N	%	N	%	N	%	N	%	N	%	N	%
Farm capacity (head)	10-20[a]	6	8.7	9	13.0	5	7.2	4	5.8	6	8.7	39	56.5
	21-30[b]	12	33.3	8	22.2	5	13.8	3	8.3	2	5.5	6	16.6
	31-40[b]	6	24.0	11	44.0	2	8.0	1	4.0	3	12.0	2	8.0
	41-50[b]	9	64.2	5	35.7	0	0.0	0	0.0	0	0.0	0	0.0
	> 50[b]	11	68.7	4	25.0	1	6.2	0	0.0	0	0.0	0	0.0
	Total	44	27.5	37	23.1	13	8.1	8	5.0	11	6.9	47	29.4

$\chi 2$ <0.05

Being with the cattle at birth allows some applications that should be done in a specific period for the newborn calf after birth. Removing the calf membranes from the calves after birth, disinfection of the umbilical cord, and colostrum intake are some essential practices. Paying attention to these sensitive elements will prevent the calves from being exposed to pathogens and ensure a healthy start to life. The farms visited in the study were asked in what order these three essential postpartum procedures were applied. As a result of the responses received, (1) removal of the pup membranes-umbilical cord disinfection- access to colostrum, (2) umbilical cord disinfection-removal of the puppies' membranes- access to colostrum, (3) access to colostrum-puppy membranes removal-umbilical cord disinfection and (4) non-application four different responses were received. It has been determined that the practices in which critical importance is given to calf health and reducing the risk of death in the farms are tried to be done carefully (Table 14). The difference between the postnatal procedures in the size of the farms was found to be significant (P<0.05).

Table 14. Procedures applied to calves after birth

	Answers	1		2		3		4	
		N	%	N	%	N	%	N	%
Farm capacity (head)	10-20[a]	24	34.8	15	21.7	4	5.8	26	37.7
	21-30[b]	15	41.7	14	38.9	2	5.6	5	13.9
	31-40[b]	15	60.0	6	24.0	2	8.0	2	8.0
	41-50[b]	4	28.6	7	50.0	3	21.4	0	0.0
	> 50[b]	6	37.5	8	50.0	2	12.5	0	0.0
	Total	64	40.0	50	31.3	13	8.1	33	20.6

$\chi 2$ <0.05

It is known that umbilical cord disinfection provides protection against infections in calves and reduces the risk of perinatal death. According to Table 15, although it was seen that more than 50% of all farms received a yes response to the question about umbilical cord care for newborn calves in the study, it is noteworthy that 40% no response was received in farms with a capacity of 10-20 heads. In all farms, disinfection with spray is the most used method of disinfection of the umbilical cord. The difference in umbilical cord care was found to be significant (P<0.05).

Table 15. Umbilical cord care in calves

	Answers	Yes, dip		Yes, spray		No	
		N	%	N	%	N	%
Farm capacity (head)	10-20[a]	4	5.8	37	53.6	28	40.6
	21-30[b]	5	13.9	26	72.2	5	13.9
	31-40[b]	7	28.0	16	64.0	2	8.0
	41-50[b]	2	14.3	12	85.7	0	0.0
	> 50[b]	3	18.7	13	81.3	0	0.0
	Total	21	13.1	104	65.0	35	21.9

$\chi 2$ <0.05

In a study conducted in Austria, the farms that participated in the survey were those who did umbilical cord disinfection (69.5%) and those who did not (26.9%). In the farms performing umbilical cord disinfection, 28.4% used the dipping or spray method, and 71.6% used other methods. In another study, according to the size of the farms, those who did not do anything in the farms of ≤20 heads and those who used the dipping and spray method were 23.8%, 28.5%, and 61.5%, respectively; In farms over 20 heads, they are listed as 29.9%, 28.6% and 52.6% in the same order (Klein-Jobstl et al. 2015).

Colostrum management is vital for calf survival and immunity. According to Godden (2008), providing a sufficient amount of high-quality colostrum intake reaches its highest level in the first 4 hours after birth regarding the efficiency of colostrum immunoglobulin transfer and its easy passage through the intestinal epithelium, and this efficiency starts to decrease after 6 hours. In the study, according to the answers received from the farms regarding the time when the calf took the first colostrum at daytime birth, the responses of colostrum intake within the first 4 hours or keeping it with the mother came to the fore (Table 16). As a result of the survey conducted in Canada found that 94.8% of calves received colostrum in the first 6 hours; In the USA, this value was reported to be 51% (Vasseur et al. 2010). After birth, the calf may not be able to absorb colostrum in a timely and sufficient amount by sucking its mother, and passive immunity transfer may fail. At this point, it would be a correct and reliable practice for the breeder to give colostrum to the calf as soon as possible.

Table 16. Reaching colostrum of calves at daytime births

	Answers	first 4 hour		4-8 hour		next to the mother	
		N	%	N	%	N	%
Farm capacity (head)	10-20[a]	19	27.5	8	11.6	42	60.9
	21-30[c]	21	58.3	5	13.9	10	27.8
	31-40[c]	11	44.0	5	20.0	9	36.0
	41-50[c]	13	92.9	0	0.0	1	7.1
	> 50[b]	15	93.7	0	0.0	1	6.3
	Total	79	49.4	18	11.3	63	39.4

$\chi 2$ <0.05

In line with the responses regarding the time for the calf to take the first colostrum at night birth, it is seen that the answers to "keep it with the mother in the first 4 hours" come to the fore (Table 17). Even though colostrum management is given importance as the operating capacity increases, it is seen that night births can cause disruptions in terms of traceability. In a survey study in dairy cattle farms in Brazil, the first colostrum intake time at night birth was in the first 4 hours (12%), the following morning (53%), and next to the mother (35%), and it was shown that the management practices of the farms with a capacity of 10-20 heads were similar (Santos and Bittar, 2015). According to the size of the farm, the first colostrum intake is important in a day and night delivery (P<0.05).

Table 17. Reaching colostrum of calves at night births

	Answers	first 4 hour		4-8 hour		next to the mother	
		N	%	N	%	N	%
Farm capacity (head)	10-20[c]	13	18.8	14	20.3	42	60.9
	21-30[c]	10	27.8	9	25.0	17	47.2
	31-40[c]	4	16.0	7	28.0	14	56.0
	41-50[b]	9	64.3	1	7.1	4	28.6
	> 50[a]	12	75.0	1	6.3	3	18.7
	Toplam	48	30.0	32	20.0	80	50.0

$\chi 2$ <0.05

Storing quality colostrum and using it later is important for calf health and welfare. Responses to the question of short and long-term (freezing) storage of excess colostrum after delivery differ between farm sizes (Table 18), (P<0.05). Stanek et al. (2014), in the survey they conducted in the Czech Republic, the use of colostrum storage application was 73.5%; Klein-Jobstl et al. (2015), in their study in Austria, this value was 72.7%. Santos and Bittar (2015) reported that the colostrum storage application of breeders in Brazil was 74%, and 93% preferred freezing. Doğan (2009) states that there is no statistical difference in performance between the group fed with whole milk and those provided with frozen colostrum in calves. Providing the right amount of quality colostrum immediately after birth provides a good start for all calves (Koyuncu and Karaca, 2018). With a different approach, it is stated that although colostrum delays the development of active immunity for calves, it is of great importance in terms of protection from diseases in the neonatal period (Blecha 1988; Blood and Radostits, 1989).

Table 18. Short or long-term storage of colostrum

	Answers	Yes, refrigerator		Yes, freezing		No	
		N	%	N	%	N	%
Farm capacity (head)	10-20[a]	4	5.8	1	1.4	64	92.8
	21-30[b]	7	19.4	3	8.3	26	72.2
	31-40[c]	7	28.0	5	20.0	13	52.0
	41-50[c]	4	28.6	7	50.0	3	21.4
	> 50[c]	4	25.0	8	50.0	4	25.0
	Total	26	16.3	24	15.0	110	68.7

$\chi 2$ <0.05

In the answers to the question of what methods are used in colostrum thawing by those who answered yes to the question of storing excess colostrum during my delivery period; according to the size of the farms, it is seen that thawing at room temperature above 60% stands out in the farms with a capacity of 41-50 and 50 heads (Table 19), (P<0.05). Contrary to the study's results, Santos and Bittar (2015) received 95% water bath and 5% room temperature answers to the question of what thawing methods are used among those who store colostrum.

Table 19. Colostrum thawing methods

	Criteria	Room temperature		Hot water bath		I don't use	
		N	%	N	%	N	%
Farm capacity (head)	10-20[e]	5	7.3	0	0.0	64	92.8
	21-30[d]	7	19.4	3	8.3	26	72.2
	31-40[c]	9	36.0	3	12.0	13	52.0
	41-50[a]	11	78.6	0	0.0	3	21.4
	> 50[b]	11	68.8	1	6.3	4	25.0
	Total	43	26.8	7	4.4	110	68.8

$\chi 2 < 0.05$

In addition to when and how much colostrum is given, the quality must be good. Passive immune transfer provided by passing antibodies in the mother's blood from colostrum to the offspring is associated with a high amount of immunoglobulins. 76.9% of the existing farms answered no to whether there is a quality control application in colostrum in the farms (Table 20). Quality control application in colostrum is important regarding farm size ($P<0.05$). It was stated that in Austria, colostrum quality control was applied in 78.7% of the existing farms, and this value was 20 heads or less (80.3%) and 20 heads (77.7%) according to the size of the farms (Klein-Jobstl et al. 2015). The method preferred by the farms controlling the colostrum quality is the visual evaluation method, with 86.1%, and the results seem to be similar to the research results. In the study conducted in the Czech Republic, it is stated that the colostrum quality control process is applied at a rate of 44.1% in the farms (Stanek et al., 2014), the result obtained from the farms on this subject in Brazil is around 89%, and among the farms that use colostrum quality control, it is 67% (Santos and Bittar, 2015).

Table 20. Assessment quality control in colostrum

	Answers	Yes, visual		No	
		N	%	N	%
Farm capacity (head)	10-20[d]	4	5.8	65	94.2
	21-30[d]	4	11.1	32	88.9
	31-40[c]	9	36.0	16	64.0
	41-50[a]	11	78.6	3	21.4
	> 50[b]	9	56.3	7	43.8
	Total	37	23.1	123	76.9

$\chi 2 < 0.05$

Colostrum feeding method has a significant effect on calf welfare. Hanninen et al. (2007) state that taking colostrum from buckets provides more comfortable sleep and rest for the calves. This study used colostrum feeding methods, leaving the calf next to the mother, and bottle feeding as criteria (Table 21). The difference between colostrum feeding methods and farm sizes was found to be significant ($P<0.05$). In a survey conducted in Brazil, 54.6% of the mother's side and 45.4% bottle or bucket feeding preferred as the colostrum feeding method (Hotzel et al., 2014). In another study, bottle feeding was found to be 46%, mother feeding 42%, and bucket feeding 9% (Santos and Bittar 2015). In a survey conducted on Canadian farms, colostrum feeding with a bottle is 51.3%, and bucket feeding is 36.5% (Vasseur et al., 2010). In the Czech Republic, bottle feeding as a

colostrum feeding method is 67.8%, and bucket feeding is 25.4% (Stanek et al., 2014). At this point, it should not be forgotten that it is possible to evaluate welfare depending on the production methods used. This assessment is based on finding environmental factors that are important to animals (Koyuncu and Altıncekic, 2007). Because the rate of passage of immune substances in colostrum from intestinal epithelial tissue decreases rapidly within hours after birth, the newborn should receive adequate immune substances as soon as possible (Taşkın et al., 2018).

Table 21. Application of colostrum feeding method

	Criteria	Mother's side		Bottle	
		N	%	N	%
Farm capacity (head)	10-20[a]	48	69.6	21	30.4
	21-30[c]	12	33.3	24	66.7
	31-40[c]	10	40.0	15	60.0
	41-50[c]	2	14.3	12	85.7
	> 50[b]	0	0.0	16	100.0
	Total	72	45.0	88	55.0

$\chi 2 < 0.05$

In some cases, the newborn calf cannot consume enough colostrum from its mother or by any of the bottle/bucket methods. In cases where such calves struggle, giving the recommended amount of first colostrum via a feeding tube may be a suitable alternative (Vasseur et al., 2010). While 71.3% of the existing farms gave the first colostrum by feeding tube, 28.7% stated that they used this method when necessary ($P<0.05$). Similar to the research results, Klein-Jobstl et al. (2015), in their study in Austria, stated that those who did not give the first colostrum with a feeding tube (63.1%) and those who did if necessary (34%). Santos and Bittar (2015) stated that 3% of the existing farms were given a feeding tube of colostrum.

Table 22. Delivery of the first colostrum by feeding tube

	Criteria	Yes if needed		No	
		N	%	N	%
Farm capacity (head)	10-20[b]	14	20.3	55	79.7
	21-30[b]	7	19.4	29	80.6
	31-40[b]	7	28.0	18	72.0
	41-50[b]	7	50.0	7	50.0
	> 50[a]	11	68.8	5	31.3
	Total	46	28.7	114	71.3

$\chi 2 < 0.05$

How much is given is as important as when the first colostrum is given. It is stated that in Holstein's calves, giving at least 4 liters of first colostrum ensures adequate absorption of immunoglobulins (100 mg) and reduces the risk of death (Weaver et al., 2000). The research shows that the amount of colostrum given to the newborn calf in the first feeding is 3 liters (60%) in farms with a capacity of over 40 heads (Table 23). The difference

between the size of the farm and the amount of the first colostrum given to the calf is significant (P<0.05). Similar results were obtained in this study as a result of a survey conducted on dairy farms in Austria (Klein-Jobstl et al. 2015). The rate of farms stating that the amount of colostrum given in the first feeding is between 2-4 liters is 71.9%. According to the size of the farms, those who give 20 heads and below between 2-4 liters are 69.9%. Those who give 2-4 liters over 20 heads are 73.5%, and it is seen that the number of those who provide a sufficient amount of colostrum increases as the operating capacity increases. In another survey conducted in Brazil, the amount of colostrum given in the first feeding was calculated as 3 liters (29%), 2 liters (20%), and together with the mother (39%) shows similarity (Santos and Bittar 2015).

Table 23. Amount of colostrum given to calves at first feding (liter)

	Criteria	2		3		4		Mother's side	
		N	%	N	%	N	%	N	%
Farm capacity (head)	10-20[c]	17	24.6	12	17.4	0	0.0	40	58.0
	21-30[d]	10	27.8	15	41.7	2	5.6	9	25.0
	31-40[d]	4	16.0	9	36.0	2	8.0	10	40.0
	41-50[b]	1	7.1	11	78.6	1	7.1	1	7.1
	> 50[a]	1	6.3	10	62.5	5	31.3	0	0.0
	Total	33	20.6	57	35.6	10	6.3	60	37.5

$\chi 2$ <0.05

Conclusion

In this study, managerial practices related to calves survivability in dairy cattle farms in Hendek district of Sakarya province were compared regarding farm sizes. In the farms visited in Hendek district, a general view of cattle breeding in the region was revealed by determining the practices that were or were not done in terms of the welfare of the cattle during pregnancy and calves after birth, nutrition, health problems, and management approach. As long as the above-normal losses of the calves, which are the future of dairy cattle farms, continue, the continuity of the farms cannot be mentioned. This study determined that calf deaths occur mainly in the first month after birth and that mismanagement practices are the basis. The fact that the death rate is calculated as 70.5% in the first thirty days after birth throughout the district and that there is no clear answer about the deaths that occur within a year reveals that the farms are quite inadequate in keeping records. Especially in small-scale (10-20 heads) farms, keeping the calves with their mothers with traditional methods is seen as a deficiency in monitoring adequate colostrum consumption. It is seen that colostrum is given to calves in a measured way in farms with a cattle capacity of 40 heads or more. However, it has been determined that colostrum quality is the most important cause of death for large-capacity farms. In this context, around 9% of the respondents answered no to the colostrum quality monitoring in small-scale farms, while it was 44% in farms over 50 heads, and it was determined that they did not have sufficient knowledge and initiative about colostrum quality. Small-scale farms in the region where traditional methods are dominant, and although these farms are sensitive about the importance of calf health and colostrum, it has been determined that they are insufficient in terms of housing and

welfare. As a result of the research, risk factors in terms of calf welfare were determined in dairy cattle farms in the district.

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