



# Diseases and Mortality Incidences of Calves Born from Imported Brown Swiss and Simmental Heifers in Western Anatolian Conditions<sup>#</sup>

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## Abstract

The purpose of this study was to find the disease and mortality incidences of calves born from pregnant Brown Swiss and Simmental heifers imported from Austria in newly established dairy cattle farm in Manisa province and determine the effect of breed, sex, calving type and calving position on calf health. The study material consisted of the 180-days health records of 62 Brown Swiss and 266 Simmental calves born alive from the pregnant Brown Swiss and Simmental heifers imported from Innsbruck Austria. The first calving of heifers was between June and December. Calves' mortality rates in 180-days

period were 3.23% for Brown Swiss and 4.89% for Simmentals; 5.39% for males and 3.73% for females; 3.14% for assisted born, 9.38% for difficult born and 3.81% for spontaneous born calves. Calves' most common health problems were digestion, respiratory and foot diseases. It was found that calving position had a significant effect on digestion problems and dystocia complications. Treatment was more successful in Brown Swiss, female, twin and spontaneous born calves.

**Keywords:** Brown swiss, calf, disease, mortality rate, simmental

## Introduction

The sustainability of a cattle enterprise is related to health and high production capacity that is only possible with a healthy and regular birth of calves. The first condition of a healthy calf has a genetically high production capacity and is resilient to changing environmental conditions. Proper care and feeding methods should be implemented under the responsibility of enterprise owners and technical personnel. Taking necessary measures before the herd gets sick, conducting regular health screening when there is a disease and implementing eradication programs ensure the protection of herd health and continuity of income.

Calves might have many diseases in their early periods. Septicemia, pneumonia and chronic diarrhea in those periods are

among the most important reasons for losing calves. Some diseases in the neonatal period might increase calf mortality rate and development disorders in the recovering calves, and even tough recovery happens calves is affected negatively in the years ahead and breeding value decreases (Donovan et al., 1998).

Calves are quite sensitive against various disease factors in their first months. Proper care, feeding and hygiene practices can prevent early period calf losses. Calf mortality rate below 5% until weaning has been considered normal for cattle enterprises (Oğan et al., 2011).

Factors effecting the calf mortality and morbidity rates in cattle enterprises include calf's breed, sex, birth season, calving position, location, herd size and different care and feeding con-

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ditions practiced (Azizzadeh et al., 2012; Lombard, et al., 2007; Lundborg et al., 2005; Parker, 1980).

A study made in 73 enterprises producing beef cattle reported that calf mortality rate until weaning was 4.5%, and the death of a cow cost 215 dollars to the enterprise. Reported death causes included dystocia (17.5%), stillbirth (12.4%), hypothermia (12.2%), diarrhea (11.5%) and respiratory diseases (7.6%) (Wittum et al., 1993).

A field study covering 100 cattle enterprises in Switzerland reported that the calf mortality rate before weaning was 5%. Of those deaths, 52.3% was due to the respiratory system, 15.9% was due to the digestive system, 11.4% was due to the circulatory system, 11.4% was due to the nervous system, 4.6% was due to the musculoskeletal system, and 2.3% was due to the urogenital system diseases. In that study, 33% of calves were treated for diarrhea, 27% were treated for pneumonia, 16% were treated for omphalitis, 1% was treated for septicemia, and 22% were treated for other diseases. It was found that diseases were more common during November, December and January in the enterprises (Busato et al., 1997).

Calving season and the hygiene and ventilation conditions of calves' location effect the incidences of digestion and respiratory system diseases, which are most common in their early periods. Being born during extremely cold weather, in dirty locations or having insufficient or extreme airflow were reported as the main factors increasing the disease incidence (Donovan et al., 1998; Lombard et al., 2007; Lundborg et al., 2005; Meganck et al., 2015).

The purpose of this study was to identify the disease incidences of the calves born from pregnant Simmental and Brown Swiss heifers imported from Austria in their first 180-day period, their treatment success rates, and mortality rates due to those diseases according to breed, sex, calving type and calving position, and determine the adaptation capacity of the calves, which were born from the cows under transport effect, to the location.

## Materials and Methods

The research protocol of the current study was approved by the Ethic Committee of the İstanbul University (Approval number: 2012/31).

### Material description

The study was conducted in a private dairy cattle enterprise, which was located in Manisa and which has recently started livestock operations. Manisa is located in Western Anatolia Region that has Mediterranean/Continental climate. Precipitation generally occurs in winter, and summer is dry (Municipality of Manisa, 2017).

The first animal material of the enterprise comprised of 70 Brown Swiss and 282 Simmental (Fleckvieh) pregnant heifers

imported from Innsbruck/Austria by the highway. Imported pregnant heifers had births between June and December in 2011 and had 328 (62 Brown Swiss, 266 Simmental) live calves.

The study material consisted of the first 180-days health records of 62 Brown Swiss and 266 Simmental calves that were born alive in the enterprise.

### Material care and feeding

The imported pregnant heifers calved between the months of June and December. Umbilical cord disinfection and septicemia serum were applied to the calves. Calves were separated from their mothers right after birth and put into individual standard calf boxes where they were fed with colostrum via feeding bottles. Colostrum quality was measured by colostrometer, and only the colostrum with high specific weight ( $1035 > \text{mg/mL}$ ) was given.

Calves consumed 10 liters of colostrum in the first 24 hours, and they were fed with milk two times a day in the following days. Calves were fed 4 liters of milk per day at the first week, consumed by the milk is gradually reduced by 60 days of age. They were given calf feed and water when milk feeding started. Calves' appetites, body temperatures and stools were checked every day.

Healthy calves after 60 days of age were taken into wider individual calf cabins in the open, and fed with pelleted calf grower feed. Calf grower feed was composed of a premix, which included 2600 kcal/kg metabolic energy and enriched with A, D, E vitamins and various minerals. They were weaned around 60-days of age. Dry alfalfa was started one week before weaning. After weaning, calves were grouped according to sex, age and weight. They were taken into a semi-open young animal barn and raised in groups of 15. Young animal shelters were open, airy, dry base floor.

Calves passed to coarse fodder after 60 days, and they were given TMR (Total Mix Ration) in addition. TMR included: 8% hay, 12% clover, 30% corn silage, 26% vetch, 6% seasonal pulp and 18% young animal feed. After 60 days, calves were introduced to silage and also given young animal ration which had: net energy maintenance-NE<sub>m</sub>: 1.57 Mcal/kg, net energy gain-NE<sub>g</sub>: 0.96 Mcal/kg, crude protein-CP: 21%DM (dry matter), acid detergent fiber-ADF: 24%DM, neutral detergent fiber-NDF: 36%DM, starch 24%DM.

### Disease incidences

Calves' health status was followed daily since their birth, and the diagnosis and treatment processes were recorded in the herd management program. Diseases were diagnosed by the veterinarian of the enterprise based on calves' body temperature, auscultation, palpation, urine and stool examination, observation and ultrasound data.

It was grouped the diagnosed disease cases as: (a) digestive diseases (*diarrhea, timpani and constipation*); (b) respiratory diseases (*pneumonia presenting with mucous or seromucous nasal flow and frequent abdominal respiration*); (c) foot diseases (*lameness in or not standing on one or more foot; swelling bleeding in joints; fractures or cracks in extremities*); (d) premature birth complications; (e) dystocia complications; and (f) anomalies. It was expressed the disease incidences, treatment success and disease-based deaths in tables.

It was evaluated the calf diseases according to breed (Simmental, Brown Swiss), sex (male, female), calving type (single, twin), and calving style (spontaneous, assisted, difficult). Calving position definitions were: (a) spontaneous calving: heifer gives birth by itself, without requiring any intervention, (b) assisted calving: calving occurs with the assistance of one or two people, (c) difficult calving: calving occurs with the help of three or more people, by using a jack or requires surgical intervention (C-section).

**Statistical analysis**

It was used “Pearson Chi-Square Test” and “Fisher’s Exact Test” for intergroup comparisons. SPSS, 1999 (Statistical Package for the Social Sciences) program package for all statistical analysis were used.

**Results**

It was grouped the disease incidence, treatment success and disease-based deaths of calves in their first 6-months according to breed, sex, calving type and calving position. It was indicated the numerical and proportional values in Table 1, Table 2, and Table 3.

The disease incidences for Brown Swiss and Simmental calves were 25.81% and 25.56%, treatment success rates were 87.50% and 80.88% respectively. Both Brown Swiss and Simmental calves had digestive, respiratory and foot diseases intensively. While the treatment success rates for respiratory and foot problems were over 94.74%, the treatment success rates for digestive problems were 83.78% and 88.89% (Table 1). The highest mortality rate was in Brown Swiss calves due to digestive system diseases and difficult labor complications. Simmental calves died due to all system diseases except for foot diseases. The highest mortality rate in Simmental calves was due to digestive system diseases (Table 3).

It was found that disease incidence and treatment success rates were 28.74% and 81.25% in male calves and 22.36% and 83.33% in female calves. Twins were born only in Simmental calves in the first production year in the enterprise. It was determined that disease incidence and treatment success rates were 26.52% and 81.93% in single born calves and 6.67% and 100.00% in twin born calves (Table 2). When It was evaluated calves’ system diseases according to sex and calving type, there was no statistically significant difference between male and

**Table 1.** Proportional values and significance controls of diseases in 0-180 days according to breed and sex (%)\*

Diseases	Breed						Sex						Overall								
	Incidence		Treatment Success		Incidence		Treatment Success		Incidence		Treatment Success		Incidence	Treatment Success							
	Brown Swiss (N:62)	Simmental (N:266)	Brown Swiss	Simmental	Male (N:167)	Female (N:161)	Male	Female	Male	Female	n	%	n	%							
Digestive diseases	9	14.52	37	13.91	8	88.89	31	83.78	24	14.37	22	13.66	18	75.00	21	95.45	46	14.02	39	84.78	
Respiratory diseases	5	8.06	19	7.14	5	100	18	94.74	16	9.58	8	4.97	16	100	7	87.50	24	7.32	23	95.83	
Foot diseases	1	1.61	6	2.26	1	100	6	100	5	2.99	2	1.24	5	100	2	100	7	2.13	7	100	
Premature birth complication	0	0	2	0.75	0	0	0	0	1	0.60	1	0.62	0	0	0	0	0	2	0.61	0	0
Dystocia complication	1	1.61	2	0.75	0	0	0	0	2	1.20	1	0.62	0	0	0	0	0	3	0.91	0	0
Anomaly birth	0	0	2	0.75	0	0	0	0	0	0	2	1.24	0	0	0	0	0	2	0.61	0	0
Overall	16	25.81	68	25.56	14	87.50	55	80.88	48	28.74	36	22.36	39	81.25	30	83.33	84	25.61	69	82.14	

\*Difference between breed and sex groups is not significant (p>0.05)

**Table 2.** Proportional values and significance controls of diseases in 0-180 days according to calving type and calving position (%)

Diseases	Calving Type						Calving Style													
	Incidence			Treatment Success			Incidence			Treatment Success										
	Single (N:313)		Twin (N:15)	Single		Twin	Assisted (N:159)		Difficult (N:64)	Spontaneous (N:105)		Assisted		Difficult	Spontaneous					
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%				
Digestive diseases	46	14.70	0	0	39	84.78	0	0	14	8.81 <sup>b</sup>	18	17.14 <sup>a</sup>	11	78.57	12	85.71	16	88.89		
Respiratory diseases	23	7.35	1	6.67	22	95.65	1	100	10	6.29	4	6.25	10	9.52	9	90.00	4	100		
Foot diseases	7	2.24	0	0	7	100	0	0	3	1.89	2	3.13	2	1.90	3	100	2	100		
Premature birth complication	2	0.64	0	0	0	0	0	0	0	0	0	0	2	1.90	0	0	0	0		
Dystocia complication	3	0.96	0	0	0	0	0	0	0	0 <sup>b</sup>	3	4.69 <sup>a</sup>	0	0 <sup>a</sup>	0	0	0	0		
Anomaly birth	2	0.64	0	0	0	0	0	0	1	0.63	1	1.56	0	0	0	0	0	0		
Overall	83	26.52	1	6.67	68	81.93	1	100	28	17.61 <sup>b</sup>	24	37.5 <sup>a</sup>	32	30.48 <sup>a</sup>	23	82.14	18	75.00	28	87.50

a, b: Differences between the means marked with different letters in the same line are significant (p<0.05)

**Table 3.** Mortality rates and significance controls of diseases in 0-180 days (%)

Causes of Death Reason	Breed						Sex														
	Brown Swiss (N:62)			Simmental (N:266)			Male (N:167)			Female (N:161)			Calving Type			Calving Style					
	Single (N:313)		Twin (N:15)	Single (N:159)		Difficult (N:64)	Single (N:167)		Female (N:161)	Single (N:159)		Difficult (N:105)	Single (N:328)		Difficult (N:105)	Spontaneous (N:328)					
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%			
Digestive system diseases	1	1.61	6	2.26	6	3.59	1	0.62	7	2.24	0	0	3	1.89	2	3.13	2	1.90	7	2.13	
Respiratory system diseases	0	0	1	0.38	0	0	1	0.62	1	0.32	0	0	1	0.63	0	0	0	0	1	0.31	
Dystocia complication	1	1.61	2	0.75	2	1.20	1	0.62	3	0.96	0	0	0	0 <sup>b</sup>	3	4.69 <sup>a</sup>	0	0 <sup>b</sup>	3	0.92	
Premature birth complication	0	0	2	0.75	1	0.60	1	0.62	2	0.64	0	0	0	0	0	0	0	2	1.90	2	0.61
Anomaly	0	0	2	0.75	0	0	2	1.24	2	0.64	0	0	1	0.63	1	1.56	0	0	2	0.61	
Foot diseases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

a, b: Differences between the means marked with different letters in the same line are significant (p<0.05)

female, or single and twin calves ( $p>0.05$ ). It was found that the mortality rates of male and female calves were similar. Calf deaths occurred only in single born calves. Twin calves' number was 15 because one of the twins was stillborn.

According to calving style, It was found that calves with difficult and spontaneous labor had a higher disease rate compared to ones with assisted labor, while the difference between groups was not statistically significant ( $p>0.05$ ). Calves with assisted labor had lower rates in all diseases except for anomaly complications. There was no statistically significant difference between calving position groups in terms of disease treatment success ( $p>0.05$ ).

Differences between groups' mortality rates based on breed, sex and calving type were not statistically significant both in general and in specific system diseases ( $p>0.05$ ). Although the mortality rate of calves with difficult labor was more than the ones with assisted and spontaneous labor, this difference was not statistically significant. The calf mortality rate due to difficult labor complication was 4.69%, and there was no calf death due to other calving positions ( $p<0.05$ ).

## Discussion

Calves' overall mortality rate for the first 180-days was 4.57%; it was 4.89% and 3.23% for Simmental and Brown Swiss respectively. Considering that the generally-targeted calf mortality rate for dairy cattle enterprises is below 5% (Oğan et al., 2011), the values found for the first lactation calves were within normal acceptable limits for both breeds.

Mortality rates until weaning for Simmental and Brown Swiss calves were lower than the rates reported by Klein-Jöbstl et al. (2015) for calves in Austria, by Silva Del Rio et al. (2007) for Holstein, Fuerst-Waltl et al. (2012) for Brown Swiss, and by Stanton et al. (2011) for Holstein; and similar to the rates reported by Gürçan et al. (2014) for Simmental hybrid, by Torsein et al. (2011) for various cows and by Fuerst-Waltl et al. (2010) for Simmental. Calf mortality rates were at reasonable levels because the studied enterprise was new, and the technical personnel practiced good care, feeding and veterinarian services for the cows and calves during and after labor.

The effect of breed, sex, calving type and calving position were generally insignificant for the first term calf deaths. This can be explained with the fact that calves were born in the same months and subjected to an attentive care and feeding program. In this period, all of the calf deaths were among single born calves. Twin born calves did not have any deaths in the first period which were probably due to the fact that their numbers were few (4.5% of all calves were twin born).

Deaths were more in calves with difficulty labor than those with spontaneous and assisted labor. This might be because labor complications adversely affected calves' survival and resilience and increased in mortality rates particularly in first weeks.

It was found that Brown Swiss and Simmental calves mainly had digestive (14.02%), respiratory (7.32%) and foot disease (2.13%) problems in similar rates in their first 180-days. Calves' the digestive and respiratory system diseases were higher than other disease rates, which was consistent with literature (Busato et al., 1997; Gulliksen et al., 2009; Klein-Jöbstl et al., 2015; Svensson et al., 2003; Ünal et al., 2001). Calves' respiratory and digestive problems were at reasonable levels (14.02% and 7.32%), and this was because births occurred collectively in summer and autumn, and shelters had good hygiene and ventilation conditions.

While breed, sex and calving type did not affect disease incidence, calving position (assisted, difficult, spontaneous) had a statistically significant effect on digestive and difficult labor complications. Disease incidence was higher in calves with spontaneous and difficult labor. After the medical intervention for the calves' diseases, treatment success was above 80% for all sub-groups. In general, whole foot disease cases succeeded treatment. The treatment success rate was 95.83% for the respiratory system diseases and 84.78% for the digestive system diseases. None of the labor complication or anomaly cases had treatment success. Labor difficulty and twin births have been reported as significant risk factors for both cow and calf health in the cases of heifers giving birth for the first time (Busato et al., 1997; Lombard et al., 2007; Meganc et al., 2015). The findings of our study were consistent with the reports that the disease incidence of such calves were higher different breeds.

In our study, It was found very lower values than the ones (diarrhea 29%, naval infections 29%, pneumonia 25%) reported for the most common diseases for dairy cattle enterprises by Oğan et al. (2011) and calculated in literature. Simmental and Brown Swiss calves had no problem in adapting to the location, which indicated that reasonable levels are attainable in calf disease control with the help of rational calf care and veterinarian practices in the enterprise.

The mortality rates of the calves born from pregnant Brown Swiss and Simmental heifers were at normal and acceptable levels in the first 180-days. Calves mostly had digestive, respiratory and foot diseases. It was found that disease incidence was not affected by breed, sex and calving type, while calving position had a significant impact on digestive problems and difficult labor complications. Calves with spontaneous and difficult labor had a higher disease incidence. The treatment success rate of the medical interventions for calves' diseases was high. Treatment success rate was higher in Brown Swiss, female, twin and spontaneous born calves.

Both breeds had no serious problems in adapting to local conditions; the calves of both breeds responded positively to treatments in emerging diseases with the help of rational herd management and health practices except for the cases of difficult labor complications and anomalies; and much attentive care

was needed for the cows and calves involved in such labors in order to minimize difficult labor complications. In order to reduce the calf losses in the dairy cattle farms in the western Anatolian region, it is recommended primarily taking preventive health precautions for the importance of highlighted diseases in this study. This type of studies with more animals, breeds and regional scales will support these research findings.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of the İstanbul University (Approval number: 2012/31).

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