

# The Comparison of growth performances of difficult and normally born calves

## Abstract

In this study, it was aimed at comparing the growth performances of calves born with difficulty and normal calves. The first and most important objective in cattle breeding is to produce a sufficient number of calves within the morphological and physiological limits determined by genetics. In this sense, calf yield varies according to the number of pregnant cows and live-born calves in the herd per unit time. In cattle breeding, especially in dairy cattle breeding, one of the factors that negatively affects calf yield is calving difficulty or difficult calving. Difficult births are generally a cause of significant economic loss for enterprises due to the risks they pose for the health of both cow and calf. In order to compare the growth performances of the calves born with difficulty and normal calves, the birth weight and weaning weight of calves born with difficulty and normal calves were weighed according to whether the births were assisted or not. It was determined that the rate of difficult birth was 14,38% in the enterprise. In the study, it was determined that normal-born calves had an average birth weight of 39.24 kg and Dystocia-born calves had an average birth weight of 39.50 kg. It is understood that the average birth weights of the normal-born calves varied between 21,00 and 54,00 kg, while the average birth weights of the Dystocia-born calves varied between 28,00 and 53,00 kg. In the analysis of variance, the differences between birth types were not found to be statistically significant. When the frequencies of difficult births were evaluated according to the birth weights of the calves, it was understood that difficult births were concentrated between 36 and 45 kg. However, the fact that the calves born between 26 and 35 kg also had Dystocia birth records indicates maternal pelvic bone stenosis.

**Keywords:** dystocia, calving, growth, performance

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## Introduction

In cattle breeding, delayed births or births requiring significant assistance are defined as difficult labor (dystocia). In a survey study conducted by Huxley and Whay,<sup>1</sup> it was stated that difficult parturition was defined by breeders as one of the most painful conditions of cattle. The term “difficult parturition in cattle” refers to a forced or difficult birth in the birth process of a cattle. Difficult births are usually the cause of significant economic losses for enterprises due to the risks they pose to the health of both the mother and the calf. The rate of difficult parturition in cattle is reported to be between 2% and 14% and stillbirth rate between 2% and 10%.<sup>2-5</sup> It has been reported that the survival of calves born in difficult births is significantly weakened.<sup>6</sup> Dematawewa and Berger<sup>7</sup> stated that difficult births affect production costs (41%), fertility (34%) and cow and calf diseases and losses (25%). In addition to its effects on cow culling<sup>8</sup> and stillbirth,<sup>9</sup> dystocia increases the likelihood of respiratory and digestive disorders in both cow and calf, as well as placental abruption, reproductive disease, mastitis and hypocalcemia.<sup>10-12</sup> Moreover, a cow that has had a difficult delivery once is likely to experience this difficulty again. The rate of dystocia in cattle refers to the frequency of difficulties faced by cattle during the parturition process. It represents the proportion of births classified as difficult births relative to the total number of births in a given time period. Difficult birth rate can be an important indicator to assess the success and effectiveness of an animal breeding program. Low Dystocia birth rates are considered a positive indicator for healthy parturition processes and overall animal welfare, while high dystocia rates may indicate the frequency of problematic parturition processes. High dystocia rates may mean that cattle have more difficulties during parturition and are more in need of intervention. Low dystocia rates, on the other hand, generally indicate the maintenance of healthy parturition processes and overall animal welfare.

Garry<sup>13</sup> states that this issue is more common in dairy cattle because milk yield is more important than calving ease. However, the researcher states that factors such as dairy cow breed, care and feeding management have a significant effect on the rate of dystocia. In 2005, although the rate of difficult parturition seems to be low internationally, calving assistance rates ranging from 10%,<sup>14</sup> to >50%,<sup>15</sup> are reported to be high. There are studies reporting higher rates of difficult calving in heifers than in cows.<sup>8,16-19</sup>

The causes of dystocia are listed as 38% calf birth weight, 16% cow size, 28% cow pelvic width, 14% length of gestation, 4% other reasons.<sup>8,14,16-20</sup> The two main determinants of dystocia are calf birth weight and maternal pelvic width and these two factors account for 50% and 5-10% of the phenotypic variance in difficult parturition, respectively.<sup>20</sup> The probability of difficult parturition increases by 13% per kg birth weight.<sup>3</sup> There is a relationship between pelvic area, breed and parity between birth weight and difficult parturition. For Holstein cows, this threshold is between 42 and 45 kg, above which the rate of dystocia increases significantly.<sup>21</sup>

These conditions can interfere with the natural parturition process and may require intervention. There are few studies on phenotypic or genetic trends of dystocia in cattle breeding. However, there are also no studies on the growth performance of difficult calves

## Material and method

In this study, the records of calves born in an intensive dairy cattle enterprise were evaluated. In the study, the performance of difficult and normal calves born in the same year were compared by scanning the records of the enterprise. Dystocia in cattle can be caused by factors such as narrowness in the birth canal, improper position of the calf, and large size of the calf. These conditions may

prevent the natural birth process and may require intervention. Breed, litter size and maternal size, position of the litter, dry period feeding conditions, maternal age and health status, and various environmental factors may affect the birth process. Within the scope of this study, the data obtained from live weight weighing and calculations from these weighing results were used for the performance comparison of calves born as normal and dystocia. In this context, birth weight, total weight gain, daily live weight gains and weaning weight values were used. Calves were weighed with a sensitive electronic scale up to 100 kilograms.

**Table 1** Calf feeding process in first 70 days

Calf feeding process	Days				Weeks												
	1	2	3	4	5	6	7	2	3	4	5	6	7	8	9	10	
Colostrum	X	X	X														
Milk (L/daily)				6	6	6	6	6	6	6	6	6	6	6	6	6	6
Calf starter				Ad libitum													
Alfalfa hay				Ad libitum													

The cows in the farm are removed from milking 60 days before their probable birth dates and taken to the dry cow pen. In the last milking of the cows in the dry period, the udder is milked and emptied thoroughly and dry period antibiotics are applied to the udder and the udder is sealed by the veterinarian of the farm. Cows in the dry period are fed with a half ration based on dry matter intake to meet their nutritional needs. Roughage in the ration consists of hay and silage and is 60% of the total ration dry matter. High quality long-stemmed straw is used as roughage.

dystocia can be defined as calving difficulty resulting from prolonged calving or assisted calving.<sup>9</sup> Scoring systems have been developed to classify dystocia in cattle. The scoring scales for difficult calving used internationally generally have a linear relationship. These scoring systems are used in some countries to define "ease of calving" and in others to define "difficulty of calving".<sup>9</sup> The dystocia scoring systems range from two-point scales<sup>22</sup> to seven-point scales,<sup>8</sup> and thresholds of two or higher are generally accepted as assisted calving, while thresholds of three or higher are considered dystocia.

**Table 2** Performance comparison analysis results of dystocia and normal born calves in the farm

		Mean	Std. Deviation	Std. Error	Minimum	Maximum
Birth weight (kg)	Normal	39,24	5,29	0,33	21,00	54,00
	Dystocia	39,50	5,38	0,83	28,00	53,00
Significany level		0,77				
Weaning weight (kg)	Normal	81,36	8,23	0,52	55,00	108,00
	Dystocia	87,10	8,42	1,30	72,00	112,00
Significany level		0,00				
Total weight gain (kg)	Normal	42,12	6,96	0,44	22,00	58,00
	Dystocia	47,60	7,09	1,09	35,00	70,00
Significany level		0,00				
Daily weight gain (kg)	Normal	0,62	0,10	0,01	0,32	0,85
	Dystocia	0,70	0,10	0,02	0,51	1,03
Significany level		0,00				

It was determined that the rate of stillbirth was 14.38% in the enterprise. The rate of dystocia in cattle is reported between 2% and 14% and stillbirth rate between 2% and 10%.<sup>2-5</sup> In this study, the rate of 14.38% dystocia is above the upper limit reported in the literature. In this study, 14.38% difficult labour rate is above the upper limit reported in the literature. Our results higher than some researchers<sup>8,16-20</sup> findings 1.5% to 95% difficult birth rate. However, it is lower than the 22.6% for heifers reported by Gevrekçi.<sup>23</sup> and close

Calves were barned in individual calf huts and straw was used as litter. Calves were kept together with their mothers in the birth pen for 3 days to receive colostrum. For 70 days, they were fed twice a day with 6 liters of milk per day. Calves were accustomed to suckling from a bucket on the 4th - 7th days and were made to drink milk. Roughage and concentrate feed were offered freely in the feeders separately. As calf starter feed, 50 Kg of commercially sold feed in the form of pellets was used. Clover hay produced in the facility was used as roughage. Fresh and clean water was provided freely. The protocol applied in the 70-day milking period is given in Table 1.

In this farm, each calving was recorded by the veterinarian in two classes as normal and difficult.

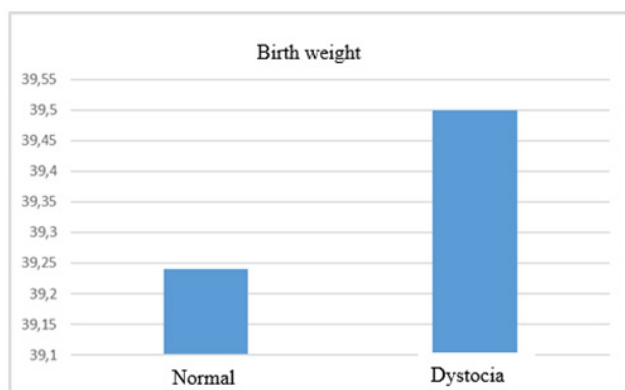
In the study, one-way analysis of variance SPSS program was used to determine whether there was a statistically significant difference between birth, weaning weight, total weight gain and daily live weight gain averages. In addition, the relationship between the rate of disease incidence in calves and the rate of dystocia was analyzed with chi-square analysis using SPSS program.

## Results and discussion

In this study, it was aimed to compare the growth performance of calves born with one of the births defined as dystocia and normal. For this reason, the data of calves born with dystocia and normal births were evaluated according to whether the births were assisted or not in the management book. The averages of birth weight, weaning weight, total weight gain and daily live weight gain of calves are summarized in Table 2.

to the 13.7% value reported for cows. The researchers also reported that 305-day milk yield (608.6 kg) and number of milking days (23.1 days) of cows with dystocia were significantly lower than those with normal parturition ( $P < 0.01$ ). The results of the study show that the 305-day milk yield and milking days of the cows with stillbirth were 925.7 kg and 26.5 days less ( $P < 0.01$ ), respectively, than those with right birth.

In the study, it was determined that the average birth weight of normal born calves was 39,24 kg and 39,50 kg (Table 2). It is understood that the average birth weights of normal born calves varied between 21,00 and 54,00 kg, while the average birth weights of dystocia calves varied between 28,00 and 53,00 kg. In the analysis of variance, the differences between birth types were not found to be statistically significant. Birth weight averages of calves according to birth type are given in Figure 1.

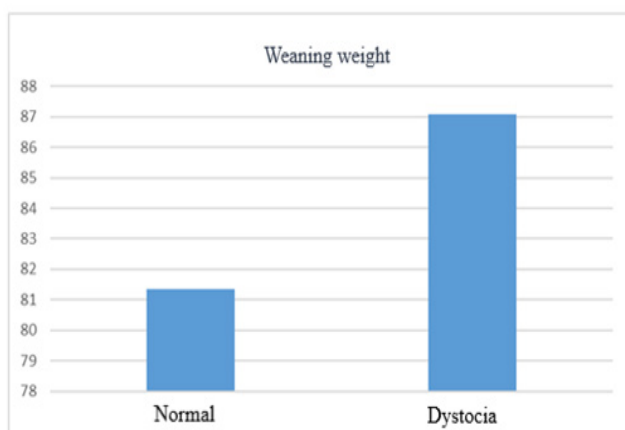


**Figure 1** Birth weight averages of calves according to birth type.

Many factors affect the birth weight of calves under the main factors grouped as genetic and environmental factors. Apart from the genetic factors affecting birth weight, there are many other factors such as maternal age, mode of birth, maternal size, maternal dry period nutritional status, calving year and season.

In this study, weaning weight gains importance since the subject of this study is to characterize the growth performance of dystocia and normal born calves raised under the same conditions. It was determined that the average weaning weight was 81.36 kg for normal born calves and 87.10 kg for Dystocia born calves (Table 2).

It was understood that the average weaning weight of normal born calves varied between 55,00-108,00 kg, while it varied between 72,00 and 112,00 kg in the difficult born calves. In the analysis of variance, the differences between birth types were found to be statistically significant ( $P < 0.00$ ). Weaning weight averages of calves according to birth type are given in Figure 2.

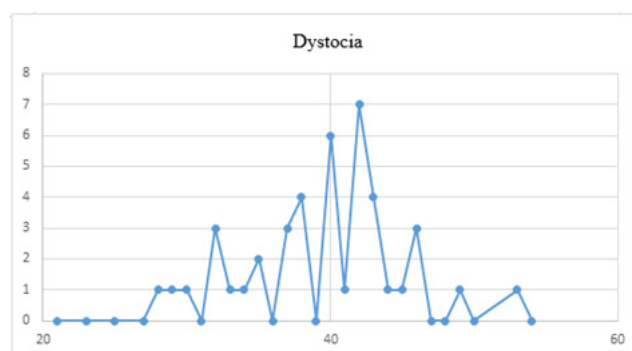


**Figure 2** Mean weaning weight of calves according to birth type.

In fact, this situation can be explained by associating it with calf birth weight which triggers difficult birth. The frequencies of calves according to their birth weights are given in Table 3 and Figure 3.

**Table 3** Dystocia frequencies of calves according to birth weight

Calf birth weight classifications	Frequency of Dystocia
20-25	0
26-30	3
31-35	7
36-40	13
41-45	14
46-50	4
50+	1

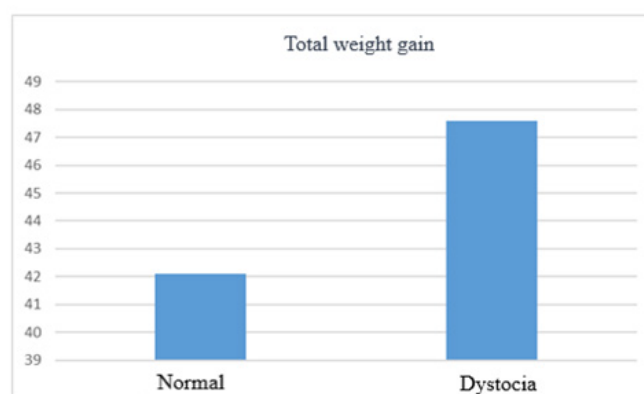


**Figure 3** Dystocia frequencies of calves according to birth weight.

When the frequencies of dystocia according to birth weights of calves are examined, it is understood that dystocia are concentrated between 36 and 45 kg and 64.28% of dystocia are seen in calves born between 36-45 kg.<sup>21</sup> reported this threshold as 42 to 45 kg.

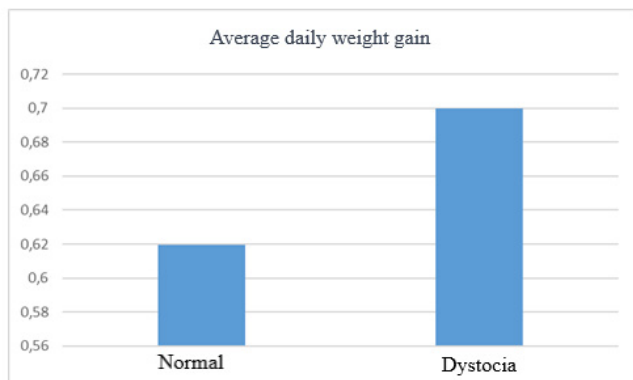
When Table 3 and Figure 3, which show the frequencies of Dystocia births according to birth weights of calves, are evaluated together, it is understood that dystocia are concentrated between 36 and 45 kg. In fact, it would be more accurate to make an explanation by considering the pelvic bone width of the mother. Because when Table 2 is examined, there are also Dystocia birth records in calves with birth weights between 26 and 35 kg.

In the study, it was determined that the total weight gain of the calves was 42.12 kg in normal born calves and 47.60 kg in dystocia calves (Table 2). It was understood that the average total weight gains of normal born calves varied between 22,00 and 58,00 kg, whereas it varied between 35,00 and 70,00 kg in those dystocia. In the analysis of variance, the effect of birth type on total weight gain was found to be statistically significant ( $P < 0.00$ ). The averages of total weight gain of calves according to birth type are given in Figure 4.



**Figure 4** Mean total weight gain of calves according to birth type.

In the study, it was determined that the daily weight gain value of normal born calves was 0.62 kg and 0.70 kg in difficult born calves (Table 2). The average daily weight gains of normal born calves ranged between 0.32 and 0.85 kg, while the average daily weight gain of dystocia calves ranged between 0.51 and 1.03 kg. In the analysis of variance, the effect of birth type on daily weight gain was found to be statistically significant ( $P < 0.00$ ). The averages of daily weight gain of calves according to birth type are given in Figure 5.



**Figure 5** Average daily weight gain of calves according to birth type.

In addition, when the health records of the calves were evaluated according to the type of birth, it was determined that the rate of health problems in the calves born with difficulty was 16%, while the rate of health problems in the calves born normally was 10.8% (5.2 times more). However, the differences between the groups were found to be statistically insignificant in the chi-square test performed for the rate of disease incidence of the dystocia and normal born calves.

## Conclusion

The first and most important objective in cattle breeding is to produce a sufficient number of calves within the morphological and physiological limits determined by the hereditary structure. In this sense, calf yield varies according to the number of pregnant cows and live born calves in the herd per unit time. One of the factors that negatively affect calf yield in cattle breeding, especially in dairy cattle breeding, is calving difficulty or dystocia. Dystocia are usually the cause of significant economic losses for farmers due to the risks they pose to the health of both the mother and the calf. However, fundamentally, difficult calving is a consequence, not a cause, and is affected by herd management practices. The main topics to be considered in enterprises to reduce the likelihood of a dystocia are listed below.

- Insemination time in heifers, taking into account the heifer's size rather than its age
- Selection of seed with easy calving traits to achieve early calving age
- Avoiding inbreeding
- Keeping records of cows with calving difficulties and using them in herd management decisions
- In the dry period, especially in the last period of pregnancy, care and feeding should be done in separate groups.

## Acknowledgments

None.

## Conflicts of interest

The authors declare that there are no conflicts of interests.

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