

# PARAMETERS AFFECTING CALVING DIFFICULTY OF CHAROLAIS AND LIMOUSIN BREED AT THE EDUCATIONAL AND RESEARCH CENTRE LOGATEC<sup>1</sup>

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## *Parameters affecting calving difficulty of Charolais and Limousin breed at the Educational and Research Centre Logatec*

The aim of our study was to analyse parameters effecting calving difficulty of Charolais and Limousin cows at the Educational and Research Centre Logatec. Data from 492 calves, born between 1995 and 2006 were included in the analysis. We estimated calving difficulty with values from 1 to 3, where 1 meant easy calving (without or with minor help), 2 – difficult calving (at least 2 persons or veterinarian help), 3 – caesarean. Breed, sex of calves, parity, single or twin births, year of calving and birth weight had statistically significant effect on calving difficulty. In Charolais breed difficult calving occurred in 18.7% and in Limousin breed in 7.8%. Twins were associated with 4 times more frequent difficult calving than singles. First parity cows exhibited more frequent calving difficulty, whereas among other parities there were no statistically significant differences. The increased birth weight increased the possibility for difficult calving.

**Key words:** cattle / breeds / Charolais / Limousin / calving / Slovenia

## 1 INTRODUCTION

Calving difficulty (dystocia) is becoming a greater concern for cattle breeders, because of the increased emphasis on rapid growth rates and improved cow efficiency. Calving difficulty causes great economic losses, especially in beef cattle. Dystocia increases calf losses, percentage of weak calves, cow mortality, veterinary

## *Analiza vplivov na potek telitve pri šarole in limuzin pasmi na Pedagoško raziskovalnem centru Logatec*

V nalogi smo analizirali vplive na potek telitve pri pasmi šarole in limuzin na Pedagoško raziskovalnem centru Logatec. Analizirali smo 492 teletih šarole in limuzin pasme, rojenih med leti 1995 in 2006. Potek telitev smo ocenili z ocenami od 1 do 3, kjer 1 pomeni lahko telitev (krava teli sama oziroma z manjšo pomočjo), 2 težko telitev (večja pomoč najmanj 2 oskrbnikov ali veterinarja) in 3 carski rez. Tako smo ugotovili, da na potek telitve vplivajo: pasma, zaporedna telitev, rojstvo dvojčkov, leto telitve in rojstna masa. Pogostnost težkih telitev je pri šarole pasmi znašala 18,7 %, pri limuzin pasmi pa 7,8. Pri dvojčkih je bila težka telitev kar 4 krat pogostejša kot pri enojčkih. Pri analizi vpliva zaporedne telitve se je izkazalo, da izstopajo predvsem prve telitve, torej telitve telic, medtem ko med ostalimi zaporednimi telitvami ni bilo razlik. S povečevanjem rojstne mase telet se je povečala verjetnost za težke telitve.

**Ključne besede:** govedo / pasme / šarole / limuzin / telitve / Slovenija

costs and deteriorates cow fertility. The aim of breeders is to receive a healthy, vital calf and keep a cow in reproduction at good condition. Environment and herd management have great influence on calving difficulty. Proper breeding before, during and after calving is the key to prevent the problems. Calf death loss at birth is about 5% if calving is normal (Radostis *et al.*, 1994). Calving difficulty increases mortality to high level. 20% of calv-

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ing difficulties terminate with dead calf (Radostis *et al.*, 1994). Most frequent causes for difficult calving are calf's birth weight and sex of calf, age, body weight, condition and parity of cow. Calf's birth weight is a function of genetic and environmental factors. Effect of season is also significant (temperature, nutrition, different sires within year) (Cady, 2004). Season is correlated with birth weight of calves. Extremely low and high temperatures reduce birth weight (Deutscher *et al.*, 1999). Breeder has considerable effect on calving. Regularly observations of animals, offering help and proper place for calving reduce calving problems (Dargatz *et al.*, 2004).

The aim of present work was to analyse the most important factors effecting calving difficulty in Charolais and Limousin herds at the Educational and Research Centre Logatec.

## 2 MATERIAL AND METHODS

Data were collected at the Educational and Research Centre Logatec from 1995 to 2006. 492 calves (299 Charolais and 193 Limousin), born in late winter or spring calving season from January to June, were included in the analysis. The age of cows at first calving was around three years. Calving difficulty has been classified into three classes: 1 – easy calving (unassisted or calving with minor help), 2 – difficult calving (at least 2 persons or veterinarian help), 3 – caesarean.

For statistical analysis CATMOD procedure in SAS/STAT (SAS, 2001) was used. Effects of breed, sex, parity, twinning calving and year of calving were included as fixed effects and birth weight as covariable within breed. Number of caesarean was extremely low (2 in Charolais breed), therefore we treated them in the statistical analysis as difficult calving. In our study the following model was used:

$$y_{ijklmn} = \mu + P_i + S_j + Z_k + R_l + L_m + b_i(x_{ijklmn} - \bar{x}_i) + e_{ijklmn}$$

$y_{ijklmn}$  calving difficulty  
 $\mu$  intercept

$P_i$  breed;  $i = 1, 2$   
 $S_j$  sex;  $j = 1, 2$   
 $Z_k$  parity;  $k = 1, 2, 3, 4, 5, 6, 7$  and more  
 $R_l$  single or twin births;  $l = 1, 2$   
 $L_m$  calving year;  $m = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11$   
 $b_i$  regression coefficient for birth weight within breed  
 $e_{ijklmn}$  residual

## 3 RESULTS AND DISCUSSION

The results of analysis of variance are presented in Table 1. Effects of parity, single or twin births and birth weight were highly statistically significant ( $P < 0.001$ ). Breed and year of calving was also statistically significant ( $P = 0.03$ ), while sex was not. The highest chi-square was noted for parity.

In our experiment, it was not possible to separate the effect of different sire and environmental conditions. Thus all effects were included in the effect year of calving. The percentage of difficult calving varied through the analysed years from 3% to 20% (data not shown), but no trend among years was observed.

Charolais cows exhibited higher percentage of difficult calving than Limousine cows; 18.7% of Charolais cows and 7.8% of Limousin cows needed help at calving. Menissier and Foulley (1977) found lower percentage of dystocia at both breeds (Charolais 8.4%, Limousin 2.1%). Differences between our and their results were probably due to different estimation scales. Anderson (1992) rep-

**Table 1:** Analysis of variance for calving difficulty  
**Preglednica 1:** Rezultati analize variance za potek telitve

Effects	DF	Chi - square	P-value
Year of calving	10	19.46	0.03
Breed	1	4.66	0.03
Parity	6	47.60	< 0.001
Single or twin births	1	32.88	< 0.001
Sex	1	0.05	0.83
Birth weight (breed)	2	19.26	< 0.001

**Table 2:** The effect of breed on calving difficulty  
**Preglednica 2:** Vpliv pasme na potek telitve

		Calving difficulty			
		Easy calving		Difficult calving	
Breed	Total number of calving	Number of calving	Percentage of calving	Number of calving	Percentage of calving
Charolais	299	243	81.3	56	18.7
Limousin	193	178	92.2	15	7.8

Easy calving (without or with minor help); Difficult calving (at least 2 persons or veterinarian help or caesarean)

**Table 3:** The effect of parity on calving difficulty**Preglednica 3:** Vpliv zaporedne teliteve na potek telitve

Parity	Total number of calving	Calving difficulty			
		Easy calving		Difficult calving	
		Number of calving	Percentage of calving	Number of calving	Percentage of calving
1	90	60	66.7	30	33.3
2	87	78	89.7	9	10.3
3	72	68	94.4	4	5.6
4	70	61	87.1	9	12.9
5	54	46	85.2	8	14.8
6	38	35	92.1	3	7.9
7 and more	81	73	90.0	8	10.0

resented results of calving difficulty on crossbred cows. All cows were crossed with Hereford or Angus (X). Limousin-X had 9% of difficult calving, Charolais-X had 12%, Jersey-X had 4% and Simmental-X had 14% of difficult calving. Differences among breeds of the dam were most likely due to differences in relative pelvic area, muscling or fatness.

Analysis showed high percentage of difficult calving at first parity, whereas among other parities there were no statistically significant differences (Table 3). Difficult calving was around three times more frequent at first parity than at later parities. Dargatz *et al.* (2004) analysed 29,375 suckler cows and established 16.7% of dystocia at heifers and 2.8% at other cows. High rates of dystocia among first-calf heifers were mostly due to the fact that they were smaller at first parturition than at subsequent calving. Fatter heifers had also high incidences of dystocia just as severely as underdeveloped. Cady (2004) published data that indicate that first calf heifers experience problems twice as often as older cows. The most frequent reason was that they were usually not full grown-up. But on the other hand Cady (2004) stressed that heifer calves born with ease may have a difficult time giving birth later.

Twin calves are small, grow slowly and also have higher mortality. Despite lower birth weight, twin calves

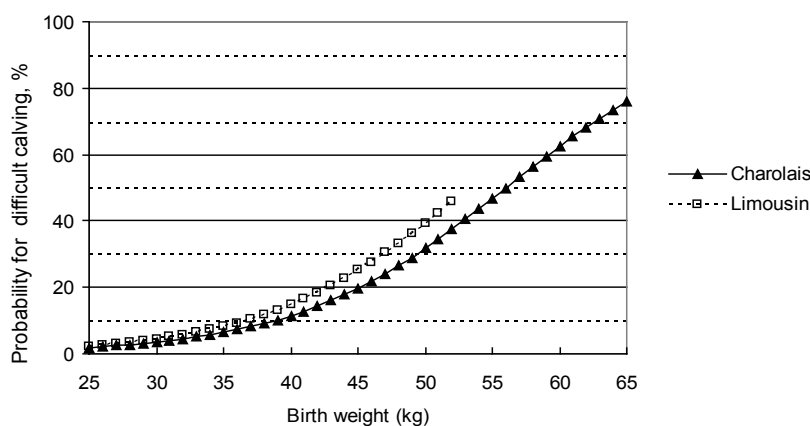
had 4 times more problems at calving than single calves (Table 4). Difficult calving could be a result of abnormal position in uterus, disproportion between foetuses or low body condition of the cow. The research performed by Gregory *et al.* (1996) showed that survival at birth was 13% higher for singles compared to twins, and the difference in survival in favour of singles remained also after 72 hours, 150 and 200 days.

The effect of sex on calving difficulty was not statistically significant in our experiment ( $p = 0.83$ ). On the contrary, several other researches reported on the correlation between sex and calving difficulty. Aitchison and Johnson (1985) showed 2 times more frequent calving difficulty with male calves compared to females. Ritchie and Anderson (1994) summarised that bull calves exhibited 10 to 40% higher assistance rate than heifer calves. At the same time the authors stressed that much of the influence of sex of calf is indirect, through its effect on increased male calf size, though after correction for birth weight, some differences in dystocia still remained. In our analysis the comparison between male and female animals was made at the same birth weight, and this is probably the main reason that we could not find any effect of sex on calving difficulty.

Fig. 1 shows correlation between birth weight and

**Table 4:** The effect of twinning on calving difficulty**Preglednica 4:** Vpliv telitve z dvojčki oz. enojčki na potek telitve

Calving	Total number of calving	Calving difficulty			
		Easy calving		Difficult calving	
		Number of calving	Share of calving (%)	Number of calving	Share of calving (%)
Single birth	472	411	87.1	61	12.9
Twin birth	20	10	50.0	10	50.0



**Figure 1:** The effect of birth weight on calving difficulty.

**Slika 1:** Potek telitve v povezavi z rojstno maso teleta.

calving difficulty. Increased birth weight had a negative effect on easy calving in both breeds. The probability for difficult calving in Charolais breed at 39 kg birth weight was 10%, at 45 kg 20% and at 50 kg 30%. In Limousin breed the probability for difficult calving also duplicate and triplicate when birth weight increased from 37 kg to 43 and 47 kg, respectively. So increased birth weight for one kg at 30 kg birth weight had for consequences increased probability for 0.5% and 0.6% in Charolais and in Limousin breed respectively. Whereas at 50 kg birth weight, increasing birth weight for one kg means increased probability for difficult calving for 2.8% and 3.2% in Charolais and in Limousin breed respectively.

At the same birth weight, the probability for difficult calving is greater in Limousin than Charolais breed. If we want to compare both breeds, we have to consider the differences between birth weight of Charolais and Limousin calves. Thus, if we compare the probability for difficult calving in both breeds at the average birth weight (42.5 kg for Charolais and 36.2 kg for Limousin breed), then we can see that the probability for difficult calving is much higher in Charolais (15.3%) than in Limousin (8.5%) breed.

Nazzie *et al.* (1991) reported that the effect of calf birth weight was the most important factor determining calving difficulty. Their research included 547, 2-years old beef heifers of three breeds. They concluded that the selection on lower birth weight could be the answer to calving ease. But on the other side they were aware that there is also a strong correlation between birth weight, growth rate and weaning weight. Furthermore, they established that female calves with lower birth weight had significantly more problems later when they calve. The

ration between birth weight of calf and weight of cow is also important.

#### 4 CONCLUSIONS

The results of the performed analysis of calving difficulty in Charolais and Limousin breed showed that the most significant and important effect on calving difficulty was parity, followed by single or twin births, birth weight, year of calving and breed. Increased calving difficulty was observed in the first parity cows, whereas no differences were observed among other parities. Abnormal position of the calves in the uterus was probably the most important factor for observed difficult calving in twin births. With increased birth weight the probability for difficult calving increased. One kg increase in birth weight increased calving difficulty much more at heavier birth weights. Sex showed no significant effect on calving difficulty.

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