University of Veterinary Medicine Budapest
Department and Clinic for Production Animals

The prevalence of foetal malpresentation in dairy

By
Alan Weekes

Tutor:
Professor Dr. Ottó Szenci PhD, DSc, Dipl. ECBHM

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ABSTRACT

This thesis focuses on the prevalence of dystocia due to “foetal malpresentation” in that this term is used to encompass abnormalities in foetal presentation, position and posture. It is an undesirable event for the dairy or beef farmer when the expulsion of a calf is obstructed endangering both mother and calf. The normal presentation of the calf is longitudinal anterior or posterior in a dorsal upright position with all body parts extended in the birth canal for parturition, any other position is considered as a malpresentation. The various types of malpresentations are for example deviation of the head, carpal flexion and hock flexion.

Data was recorded and analyzed from Dairystream farm of over 300 Holstein Friesian cows and compared with reviewing studies conducted by various authors on the prevalence of malpresentations. Factors contributing to the prevalence of malpresentation are: the year, breed of sire used, breeding effects as in crossbred, purebred and local breeds of cows, effects of increasing foetal numbers i.e. twins and their distribution between the left and right uterine horns. Examining the physiology of malpresentation does not seem to be fully understood. Nevertheless, around the seventh month of gestation the presentation is either anterior or posterior and the reversal should not happen as the length of the foetus is longer than the diameter of the amnion.

Malpresentations need to be minimized to improve reproductive performance and maximize profits as it is one of the most common causes of dystocia. There is also economic importance of reducing the amount of malpresentations in terms of calf losses, veterinary costs, treatment, prevention and subsequent impaired reproductive performance.

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CHAPTER 1: INTRODUCTION

In Ireland there are over 18,000 dairy farmers who milk Ireland's 1.4 million dairy cows. Irish dairy farmers are among the most competitive on the world stage which is no wonder due to a perfect temperate climate allowing Irish dairy farmers to grow large quantities of grass over a long season. This advantage propels the Irish dairy industry to the most profitable of Ireland's mainstream agricultural enterprises. The milk yield (i.e. profit) is dependent on many factors but of course the most importing is the reproductive performance to have a good lactation cycle. Parturition is a critical time as poor management during this period can affect the future reproductive and productive life of the herd. The term dystocia means difficult parturition which has many causes and side effects. One of the most frequent and potent causes of dystocia is foetal malpresentaion and it is the term I will generally use in this thesis to describe any type of abnormality in the presentation, posture or position of the fetus in the birth canal.

Presentation means the relation of the long axis of fetus to that of the dam, the normal is longitudinal presentation (anterior, posterior). Abnormal: dorso-transverse presentation, ventro-transverse presentation, dorso-vertical presentation, ventro-vertical presentation. Position means the relation of the vertebral column of the fetus to that of the dam, the normal is dorsal upright position. Abnormal: ventral positon and lateral positon (left, right). Posture means the relation of the head, neck and legs of the fetus to its trunk, the normal is flexed (only during pregnancy) and extended (only during parturition). Abnormal posture can be of the head, front leg or hind leg. Abnormal postures of the head are lateral deviation of the head, downward deviation of the head or upward deviation of the head. Abnormal postures of the front leg are carpal flexion, incomplete extension of the elbow and shoulder flexion. Abnormal postures of the hind leg are hock flexion or hip flexion also called breech.

CHAPTER 2: A SURVEY OF LITERATURE

Dystocia in cows can be caused by a number of factors including uterine torsion, calf birth weight, multiple calving's, perinatal mortality, cow pelvic area, age of the cow, body weight and condition of cow at calving, gestation length, the place of calving, year and season of calving, maintenance practices, disorders, nutrition, the sex of the calf and malpresentations [1]. In general it has been said that causes of dystocia are foetus-pelvic disproportion, malpresentation, and maternal problems [2]. Perhaps obvious that dystocia in primiparous dams is most often due to foetus-pelvic disproportion, whereas dystocia in multiparous cows is more frequently due to malpresentation or maternal problems. A possible reason for increase in calf dead is herd size as cows are not managed as well in larger herds [3].

Various types of malpresentations have been reported and are the most common cause of dystocia in pluriparae [4, 5, 6]. Which are probably due to reduced viability and activity of the offspring [7]. Interestingly huge amount of authors reported that posture and presentation of the foetus is a delicate event; at the beginning of parturition the foetus presentation could change and posture sometimes can change as late as the start of the second stage of labour [8]. Therefore malpresentation may occur due to the failure of the foetus to rotate from the intrauterine position to the normal parturient position. The normal parturient presentation and position assumed by the foetus at the time of delivery is anterior longitudinal presentation, dorso-sacral position with the head resting on metacarpal bones of the extended forelimbs. Every other type of presentation or position will probably cause dystocia [7].

The most common malpresentation is a posterior malpresentation, forelimb malposture, breech or cranial malposture, in that order [9]. In dairy, malpresentation was observed as the most frequent cause of dystocia by many authors 39.8%, [10]; 66.6%, [11]; 46.77%, [12]. In beef cows thirty one similar findings were recorded by [5]. However, [13] reported that malpresentation added up to only 1% of the total number of calvings. Calving studies in Iraq recorded malpresentations anterior and posterior at 51.7% and 16.3%, respectively [14]. The most frequent cause of dystocia in cattle was head deviation 20.4% and then Limb flexions 19.4% reported by [11]. Other conditions include incomplete extension of elbows and shoulder flexion. Deviations of the head are more serious causes of dystocia

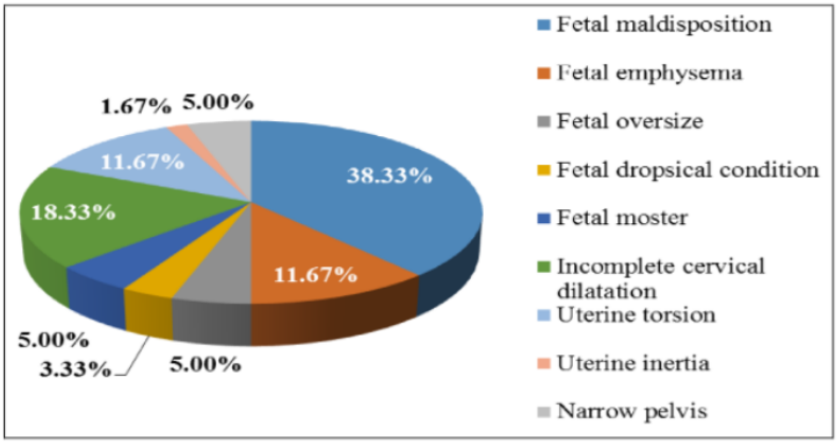
than dystocia due to forelimb deviation. The most common deviation of the head is the lateral deviation and other deviations like upward or downward deviation are rare [11]. The incidence of head deviation in studies varied from 2.5-20.4 % in cows [5, 13, 11].

Prevalence of dystocia with posterior presentation in dairy cows varies from 3.8-17% [4, 11]. Incomplete extension of the hind limbs in a posterior presentation can occur at the stifle, hock and hips. In a posterior presentation at the stifle, hock and hips, incomplete extension of the hind limbs can occur. Breech presentation in beef cows at 8.2% was recorded by [5], however, [13] recorded only one breech presentation out of 20 abnormal births.

The Teaching Veterinary Clinical Complex, Veterinary College of Hassan did a retrospective study of the prevalence of dystocia based on sixty cases of dystocia in dairy crossbred cows. Their results on table 1 and figure 1 below shows malpresentation at 38.33% and that it was the most common cause of dystocia. Primiparous and male foetus had a higher incidence compared to pleuriparous cows and female foetus respectively. The prevalence of all the dystocia cases is presented below [15].

Table 1 & Figure 1: Maternal and Fetal causes of dystocia in dairy cows [15].

Maternal cause	Cow % (n)	Fetal cause	Cow % (n)
Uterine torsion	11.67 (7)	Fetal maldisposition	38.33 (23)
Incomplete cervical dilatation	18.33 (11)	Fetal emphysema	11.67 (7)
Narrow pelvis	5.00 (3)	Fetal oversize	5.00 (3)
Uterine inertia	1.67 (1)	Fetal monster	5.00 (3)
-	-	Fetal dropsy	3.33 (2)
Total	36.67 (22)	Total	63.33 (38)



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A review in 1984 of the articles of authors ranging from the year 1965 to 1979 formed what are the main causes of dystocia represented on table 2 below. Dystocia due to malpresentation showed quite varied results with a mixture of cows and heifers, 34.4% based on a farm inquiry, 38.4% veterinary assisted in a veterinary practice, 21.1% from a farm inquiry and 26.0% veterinary assisted in a veterinary practice. Then with just cows 33.3% based on a farm inquiry, 4.6% obstetrics clinic, 13.1% obstetrics clinic, 50.0% based on a farm inquiry and 16.1% based on a farm inquiry. Finally on just heifers 1.7% obstetrics clinic, 24.6 veterinary assisted in a veterinary practice, 2.1% obstetrics clinic, 25.0% from a farm inquiry and 11.6% forced traction [4].

Table 2: Prevalence of dystocia reported by various authors [4].

Important causes of dystocia and their relative contribution to dystocia cases observed

Author(s)	Dystocia definition	Method of data collection	Data from:		Relative frequencies				
			Heifers	Cows	Feto-pelvic incompatibility	Posterior and abnormal presentation	Weak labour	Insufficient dilatation of cervix	Uterine torsion
Dreyer (1965)	>2 men	Inquiry	+	+	57.3	34.4	1.1		
Friedli (1965)	Vet. assist.	Vet. practise	+				0.0		5.7
Friedli (1965)	Vet. assist.	Vet. practise	+	+	36.8	38.4	7.5		12.5
Cloppenburg (1966)	>2 men	Inquiry	+			21.1			
Cloppenburg (1966)	>2 men	Inquiry		+		33.3			
Sloss and Johnston* (1967)	Vet. assist.	Vet. practise	+	+	46.0	26.0	5.4	9.0	
Konermann et al. (1969)	Vet. assist.	Obstetric clinic	+		73.4	1.7		14.4	6.3
Konermann et al. (1969)	Vet. assist.	Obstetric clinic		+	21.2	4.6		32.3	23.1
Sloss** (1970)	Vet. assist.	Vet. practise	+	+	29.9	24.6			
Baier et al. (1973)	Vet. assist.	Obstetric clinic	+		86.3	2.1		2.4	4.6
Baier et al. (1973)	Vet. assist.	Obstetric clinic		+	36.7	13.1		17.6	21.5
Philipsson (1976a)	>1 man	Inquiry	+			25.0			
Philipsson (1976a)	>1 man	Inquiry		+		50.0			
Price and Wiltbank* (1978b)	Forced traction	Exp. station	+			11.6			
Liboriussen (1979)	>2 men	Inquiry		+		16.1			

*Beef breeds.
**Partly beef breeds.

In a study of 131 cow fetotomy cases in Germany, the cases were evaluated and put into a range between 2 to 96 hours of labour (average 13 hours). The cases with an average of 19.2 hours labour exhibited post-operative complications and those with an average of 8.4 hours did not exhibit post-operative complications. Most of the cows 79% were in bad general health, 8% of which were unable to stand. The main cause of the dystocia was

malposture of the dead and relative or absolutely too large calves (38.9%) and (25.2%) respectively [6].

In the college of Veterinary Medicine, University of Mosul, Mosul, Iraq a study was performed on 116 clinical cases of dystocia in local breeds of Iraqi cattle, which were brought to the Obstetric Section of the College of Veterinary Medicine by local farmers. The study was conducted during the period April 1983-July 1987 and the cows ranged in age from 3 to 6 years. They were brought to the Obstetric Section about 12 hours after the onset of parturition. Methods used on the dystocia cases were correction of malpresentation, traction, hormones, foetotomy and caesarean section after been diagnosed by careful vaginal examination using aseptic techniques. The results of the study on Table 3 below show that there were 63 cows with dystocia due to some form of malpresentation, which is 79.8% of the cases. In that 17 cows (21.6%) suffered from malposture of the head flexed to the right, 14 cows (17.7%) with malposture of the head flexed to the left, 2 cows (0.25%) with malposture of the head flexed ventrally, 1 cow (0.13%) with malposture of the head flexed dorsally, 10 cows (12.7%) with malposture of the forelimbs and 17 cows (21.6%) with malposture of the hindlimbs [14].

Table 3: Prevalence and types of dystocia with dead/Live ratio and treatments [14].

Type of dystocia	Number	Calf sex M/F	Dead/alive	Treatment
Foetal dystocia	79[a]			
Anterior presentation	60[a]			
Malposture of head				
Right flexion	17	12/5	10/7	Correction + traction
Left flexion	14	10/4	8/6	Correction + traction
Ventral flexion	2	2/0	2/0	Correction + traction
Dorsal flexion	1	1/0	1/0	Correction + traction
Malposture of forelimbs	10	7/3	2/8	Correction + traction
Foetopelvic disproportion (absolute oversize)	16	9/7	10/6	Traction + caesarean section
Posterior presentation	19[a]			
Malposture of hind limbs	17	11/6	5/12	Correction + traction + foetotomy
Ventral malpresentation	2	1/1	1/1	Rotation + traction
Pathologic fetuses	13[a]			
Emphysematus	12	8/4	12/0	Traction + foetotomy + caesarean section
Foetal monsters	1	1/0	1/0	

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Colorado State University Resident beef cattle records on 3873 calvings over a 20-year period (1971 to 1991) were used to examine factors associated with malpresentations. They had 81.8% unassisted calvings and 18% which needed some form of assistance. The assisted deliveries were classed under four headings; severe traction, mild traction, malpresentation and caesarean section, which were 44.5, 31.8, 22.4 and 1.3%, respectively. This report proved that the incidence of malpresentations was affected by year, sex of calf and the breed of sire used. The heritability estimates of malpresentation as traits were 0.088 and 0.003 for Hereford and Angus breeds, respectively. Traits of the dam and repeatabilities for malpresentation were minimum. Four of the caesarean section were due to abnormal fetal alignment, these deliveries were classified as malpresentations [5] as show in Table 4.

Table 4: Number of assisted births [5].

Calving difficulty score[a]	No. of calvings	Percentage of total births	Percentage of assisted births
1	3169	81.8	--
2	224	5.8	31.8
3	313	8.1	44.5
4	9	0.2	1.3
5	158	4.1	22.4

[a]1 = unassisted, 2 = mild traction, 3 = severe traction, 4 = caesarean section, 5 = malpresentation.

The occurrence of a malpresentation is sometimes referred to as a random event. However, this study used least-squares procedures to show the effects for year, sex of calf, and breed of calf sire. The effects of dam's age mostly was very significant (P = 0.09). Table 5 shows that bull calves were approximately two times more probable to be a malpresentation than heifer calves. The breed of sire effects on malpresentation in table 5 showed that Maine Anjou was highest at 7.1%, indicating a heritable genetic influence [5].

Table 5: Prevalence of Malpresentation [5].

	n	Incidence of malpresentation	Percentage of malpresentation
Sex of calf			
Bull	2007	108	5.4
Heifer	1865	50	2.7
Breed of sire			
Angus	2177	61	2.8
Hereford	1287	85	6.6
Simmental	127	4	3.2
Gelbvieh	60	2	3.3
Red Angus	55	3	5.5
Chianina	54	0	0.0
Charolais	34	1	2.9
Limousin	23	1	4.4
Beef Fresian	17	0	0.0
Maine Anjou	14	1	7.1
Shorthorn	9	0	0.0
Crossbred	7	0	0.0
Galloway	5	0	0.0

Types of malpresentations and the frequency of occurrence are shown in Table 6. The malpresentations were carpal or shoulder flexion 11.4%, breech 8.2%, lateral deviation of the head 2.5%, incomplete extension of the elbow 1.9%, posterior ventral 1.3%, transverse 1.3% and oblique ventro-vertical 0.6%. However this study included posterior dorsal presentation as a malpresentation 72.8% [5].

Table 6: Detail on the type of malpresentation [5].

Type of presentation	n	Percentage of total malpresentations	Percentage of assisted births
Posterior dorsal	115	72.8	16.3
Carpal or shoulder flexion	18	11.4	2.6
Breech	13	8.2	1.8
Lateral deviation of the head	4	2.5	0.6
Incomplete extension of the elbow	3	1.9	0.4
Posterior ventral	2	1.3	0.3
Transverse	2	1.3	0.3
Oblique ventro-vertical	1	0.6	0.1

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The US Meat Animal Research Center carried out an interesting study on the effects of increasing foetus numbers i.e. twin births and their distribution between the left and right uterine horns on calf survival between the years 1994 and 2004. Calf birth weight and weaning weight, gestation length, dystocia, and calf sex ratio were evaluated for single (n = 1,587), twin (n = 2,440), and triplet calves (n = 147) born to primiparous and multiparous cattle. The number of foetus and their distribution in utero were determined by real-time ultrasonography at day 40 to 70 postbreeding. Interestingly the gestation length was affected by the number of foetuses 6.8 days shorter ($P < 0.01$) for twins and 12.7 days shorter for triplets (271.6 ± 0.8 days) compared with singles (277.5 ± 0.2 vs. 284.3 ± 0.2 days). The survival and birth weight of individual calves decreased ($P < 0.01$) as the foetus number increased from single to triplet births. Bilateral twin ovulation calves had an increased ($P < 0.01$) survival and birthweight, a longer ($P < 0.01$) gestation length, and less ($P < 0.01$) dystocia than twins from unilateral twin ovulations. Single births had a lower prevalence of dystocia than twin and triplet births who had a greater prevalence ($P < 0.01$) [16].

Even though cows naturally have the uterine capacity to gestate twin calves, this study showed that unilateral twins and all triplets had a decreased survival and birthweight which indicates that their growth and development may be blocked by uterine crowding. This comparison between single and twin births contributing to the increased prevalence of malpresentation is presented in table 7. The incidence of malpresentation was less ($P < 0.01$) for singles and did not differ between foetuses in the left compared to the right uterine horn (4.8% vs. 6.0%, respectively). Notably, the increased incidence with twins did differ ($P < 0.01$) by position within the uterus: bilateral twins, 33.6%; unilateral twins right, 45.7%; and unilateral twins left, 50.8%. Malpresentation was not affected by the season, however the results showed the incidence was greater ($P < 0.01$) in 2000 & 2001 compared with the other years. Age of the dam showed an increased ($P < 0.01$), being greater in dams ≥ 6 years of age [16].

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Table 7: Effect of the number and location of foetuses in utero on the prevalence of malpresentations and the interactions on sex of calf, season and age of dam producing single or twin births [16].

Birth type	Uterine horn	Number	Total %	Malpresentations %
Single	Left	711	25.1 ± 1.8	4.8 ± 1.6
	Right	876	20.3 ± 1.6	6.0 ± 1.5
Twin	Left	446	58.1 ± 2.3	50.8 ± 2.0
	Right	838	57.6 ± 1.6	45.6 ± 1.5
	Bilateral	1,158	49.8 ± 1.4	33.6 ± 1.3
Triplet	Unilateral	27	62.7 ± 11.7	62.7 ± 10.3
	Bilateral	120	70.4 ± 5.1	70.4 ± 4.7
Foetus number and location				
Left	1	711	25.3 ± 1.8	4.8 ± 1.6
Right	1	876	20.7 ± 1.7	6.0 ± 1.5
Left	2	446	58.4 ± 2.3	50.8 ± 2.0
Right	2	838	57.9 ± 1.7	45.6 ± 1.5
Bilateral	2	1,158	49.9 ± 1.5	33.6 ± 1.3

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Foetus number and location × sex of calf				
1 Left	Male	367	32.5 ± 2.6	5.9 ± 2.1
	Female	344	18.2 ± 2.5	3.7 ± 2.2
1 Right	Male	481	26.7 ± 2.2	6.1 ± 1.9
	Female	395	14.6 ± 2.4	5.9 ± 2.1
2 Left	Male	130	53.6 ± 4.0	44.4 ± 3.5
	Female	108	63.2 ± 4.4	57.9 ± 3.9
	Mixed	208	58.3 ± 3.3	50.3 ± 2.8
2 Right	Male	238	63.1 ± 3.0	49.0 ± 2.6
	Female	220	52.8 ± 3.1	42.6 ± 2.7
	Mixed	380	57.7 ± 2.4	45.5 ± 2.1
2 Bilateral	Male	326	62.8 ± 2.6	42.8 ± 2.2
	Female	284	40.2 ± 2.7	26.6 ± 2.4
	Mixed	548	46.7 ± 2.0	31.3 ± 1.7
Foetus number and location × season				
1 Left	Spring	406	21.8 ± 2.4	

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	Fall	305	28.9 ± 2.8	
1 Right	Spring	522	18.6 ± 2.1	
	Fall	354	22.8 ± 2.6	
2 Left	Spring	216	65.2 ± 3.2	
	Fall	230	51.6 ± 3.2	
2 Right	Spring	368	62.1 ± 2.5	
	Fall	470	53.6 ± 2.3	
2 Bilateral	Spring	596	51.8 ± 2.0	
	Fall	562	48.1 ± 2.0	
Age of dam, year				
2		1,190	49.3 ± 1.5	24.8 ± 1.3
3		939	41.7 ± 1.7	25.7 ± 1.5
4		735	39.2 ± 1.9	27.9 ± 1.6
5		492	38.0 ± 2.3	28.8 ± 2.0
≥ 6		670	43.9 ± 1.9	33.7 ± 1.7

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Two studies were carried out by the Veterinary Officers in field veterinary institutions conducted from October 2010 to March 2012 in different districts of Himachai Pradesh, reporting on the patterns of malpresentation cases presented and critical analysis of obstetrical procedures used [17]. The first study shown in table 8 where twenty four cows with dystocia presented in the Teaching Veterinary Clinical Complex (TVCC) of DGCN College of Veterinary and Animal Sciences, Palampur. In which four were Jersey (16.67%), fifteen crossbred (62.50%) and five (20.83%) were of local breed. The prevalence of malpresenations added up to 25% overall [17].

Table 8: TVCC prevalence of dystocia [17]

Parameters		Incidence					
		Primiparous		Pluriparous		TOTAL	
		Number	%	Number	%	Number	%
BREED OF DAM							
Jersey		2	8.33	2	8.33	4	**16.67**
Cross bred		7	29.17	8	33.33	15	**62.50**
Local non descript		2	8.33	3	12.50	5	**20.83**
Total		**11**	**45.83**	**13**	**54.17**	**24**	**100.00**
HISTORY AND ANAMNESIS							
Insemination	Artificial	11	45.83	11	45.83	22	91.67
	Natural	-	-	2	8.34	2	8.34
Gestation	Complete	9	37.50	12	50.00	21	87.50
	Incomplete	2	8.33	1	4.17	3	12.50
Previously handled	Handled	5	20.83	11	45.84	16	66.67
	Not handled	6	25.00	2	8.33	8	33.33
Status	Fresh	6	25.00	3	12.50	9	37.50
	Delayed	5	20.83	10	41.67	15	62.50
General health status of dam	Healthy	6	25.00	4	16.67	10	41.67
	Weak	5	20.83	9	37.50	14	58.33
ETIOLOGY OF DYSTOCIA							
Maternal Causes							
Uterine Inertia		1	4.17	1	4.17	2	8.33
Incomplete dilatation of cervix		3	12.50	3	12.50	6	25.00
Uterine Torsions		2	8.33	3	12.50	5	20.83
Narrow pelvis		2	8.33	2	8.33	4	16.67
Total		**8**	**33.33**	**9**	**37.50**	**17**	**70.83**
Fetal Causes							
Head Deviation	Left	1	4.17	1	4.17	2	8.33
	Right	-	-	1	4.17	1	4.17
	Total	**1**	**4.17**	**2**	**8.33**	**3**	**12.50**
Carpal Flexion	Unilateral	-	-	1	4.17	1	4.17
	Bilateral	1	4.17	-	-	1	4.17
	Total	**1**	**4.17**	**1**	**4.17**	**2**	**8.33**
Hock Flexion	Unilateral	1	4.17	-	-	1	4.17
	Bilateral	-	-	-	-	-	-
	Total	**1**	**4.17**	-	-	**1**	**4.17**
Fetal Oversize		-	-	1	4.17	1	4.17
Total		**3**	**12.50**	**4**	**16.67**	**7**	**29.17**
Grand Total		**11**	**45.83**	**13**	**54.17**	**24**	**100.00**
TREATMENT AND POST OPERATIVE OBSERVATIONS							
Treatment Adopted	Mutations	8	33.33	8	33.34	16	66.67
	Cesarean	3	12.50	5	20.83	8	33.33
Fetus status	Live	6	25.00	5	20.83	11	45.83
	Dead	5	20.83	8	33.34	13	54.17
Fetus sex	Male	7	29.16	9	37.50	16	66.66
	Female	4	16.67	4	16.67	8	33.34
Dam status	Live	9	37.50	10	41.67	19	79.17
	Dead	2	8.33	3	12.50	5	20.83

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The second study was in the field veterinary institutions of Himachal Pradesh a total of three hundred and fourteen malpresentation cases were included under field survey as shown in table 9. Forty six were Jersey, eight were Holstein Friesian, two hundred and six were crossbred and fifty four were of local non-descript breed. There were 212 pluriparous and 102 primiparous. The malpresentations were deviations of head/neck (13%) and limb flexions (total 26%: shoulder flexion 5%, carpal flexion 9%, hock flexion 6%, hip flexion 6%) were major cause of dystocia, giving a total of 39% of malpresentations [17].

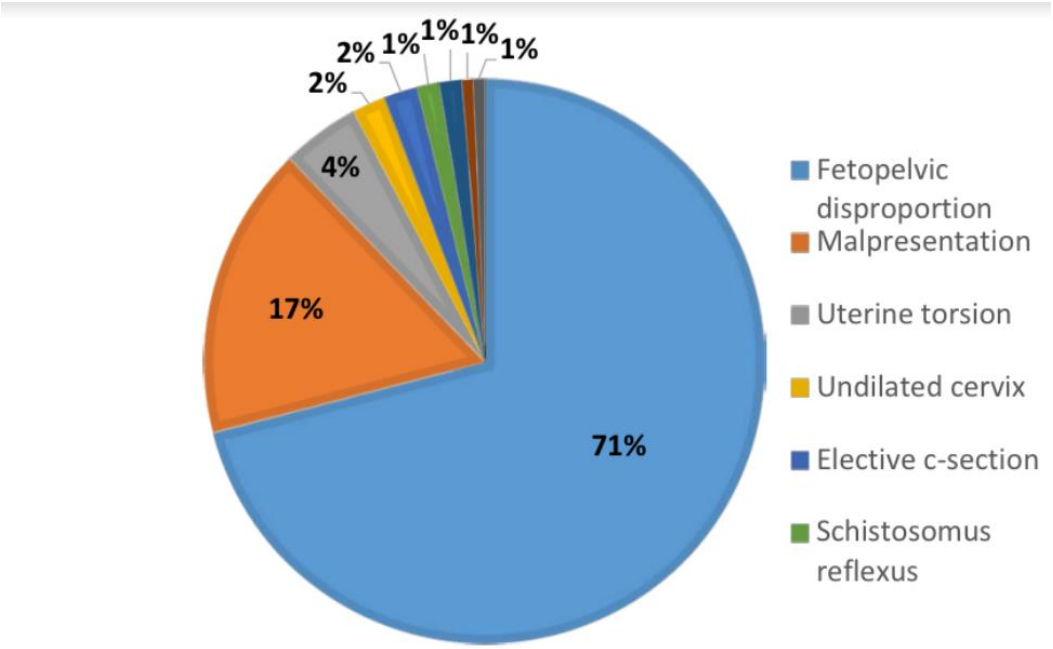
Table 9: Veterinary institutions of Himachal Pradesh etiology of dystocia [17].

Parameters		Incidence					
		Primiparous		Pluriparous		TOTAL	
		Number	%	Number	%	Number	%
REED OF DAM							
	Jersey	18	5.73	28	8.92	46	14.6
	HF	2	0.64	6	1.91	8	2.5
	Cross bred	62	19.75	144	45.86	206	65.6
	Local non descript	20	6.37	34	10.83	54	17.2
	Total	**102**	**32.48**	**212**	**67.52**	**314**	**100.0**
STORY AND ANAMNESIS							
ısemination	Artificial	88	28.03	182	57.96	270	85.9
	Natural	14	4.46	30	9.55	44	14.0
Gestation	Complete	94	29.94	196	62.42	290	92.3
	Incomplete	8	2.55	16	5.09	24	7.6
Previously handled	Handled	36	11.46	98	31.21	134	42.6
	Not handled	66	21.02	114	36.31	180	57.3
Status	Fresh	42	13.38	134	42.68	176	56.0
	Delayed	60	19.11	78	24.84	138	43.9
ıneral health atus of dam	Healthy	70	22.29	152	48.41	222	70.7
	Weak	32	10.19	60	19.11	92	29.3
ETIOLOGY OF DYSTOCIA							
Maternal Causes							
	Uterine Inertia	16	5.10	22	7.00	38	12.10
	Incomplete dilatation of cervix	16	5.10	22	7.00	38	12.10
	Uterine Torsions	8	2.55	20	6.37	28	8.92
	Narrow pelvis	22	7.00	18	5.73	40	12.74
	Total	**62**	**19.75**	**82**	**26.11**	**144**	**45.86**
Fetal Causes							
Head Deviation	Left	4	1.27	14	4.46	18	5.73
	Right	2	0.64	10	3.18	12	3.82
	Downward	-	-	10	3.18	10	3.18
	Total	**6**	**1.91**	**34**	**10.83**	**40**	**12.74**
Shoulder flexion	Unilateral	2	0.64	10	3.18	12	3.82
	Bilateral	-	-	4	1.27	4	1.27
	Total	**2**	**0.64**	**14**	**4.46**	**16**	**5.10**
Carpal Flexion	Unilateral	6	1.91	16	5.10	22	7.00
	Bilateral	2	0.64	4	1.27	6	1.91
	Total	**8**	**2.55**	**20**	**6.37**	**28**	**8.92**
Hock Flexion	Unilateral	4	1.27	10	3.18	14	4.46
	Bilateral	-	-	6	1.91	6	1.91
	Total	4	1.27	16	5.10	20	6.37
Hip flexion	Unilateral	4	1.27	6	1.91	10	3.18
	Bilateral	2	0.64	6	1.91	8	2.55
	Total	**6**	**1.91**	**12**	**3.82**	**18**	**5.73**
	Fetal Oversize including anasarca	10	3.18	20	6.37	30	9.55
	Fetal monsters including hydrocephalous	4	1.27	14	4.46	18	5.73
	Total	**40**	**12.74**	**130**	**41.40**	**170**	**54.14**
	Grand Total	**102**	**32.48**	**212**	**67.52**	**314**	**100.00**
TREATMENT AND POST OPERATIVE OBSERVATIONS							
Treatment adopted	Mutations	88	28.03	166	52.87	254	80.89
	Cesarean	14	4.46	40	12.74	54	17.20
	Fetotomy	-	-	6	1.91	6	1.91
Fetus status	Live	66	21.02	94	29.94	160	50.96
	Dead	36	11.46	118	37.58	154	49.04
Fetus sex	Male	62	19.74	120	38.22	182	57.96
	Female	40	12.74	92	29.30	132	42.04
Dam status	Live	88	28.03	180	57.32	268	85.35
	Dead	14	4.46	32	10.19	46	14.65

The prevalence of foetal malpresentation in dairy

Purdue University College of Veterinary Medicine's Veterinary Teaching Hospital for the surgical management of dystocia using cesarean section reports a study on 155 beef cattle cases. There were 110 cases of foetus-pelvic disproportion at 71.0%, 26 cases of malpresentation at 16.8%, 7 cases of uterine torsion at 4.5%, 3 cases of undilated cervix at 1.9%, 3 cases needing a cesarean section at 1.9%, 2 cases of schistosomus reflexus in the calf at 1.3%, 2 cases of inadequate space due to twinning at 1.3%, 1 case of small vaginal tract at 0.6%, and one dead dam at 0.6% [18].

Figure 2: Prevalence of dystocia and various causes [18].



CHAPTER 3: METHODOLOGY

Materials & Methods

I gathered and analyzed my own data from working on a dairy farm in Ireland. Over three hundred Holstein-Friesians were calved during the autumn and spring calving seasons, October and November 2017 and mid-January, February and early March 2018 respectively. The study of 308 Holstein-Friesian cattle (52 primiparous and 256 multiparous) in a very proposes dairy farm in Co. Wexford, Ireland called Dairystream. The owner Mr. John Murphy chairman of Glanbia PLC (global dairy group) and he is Vice-Chairman of the National Dairy Council of Ireland. He hired me as the chief herdsman as I live nearby and I already had a wealth of experience in calving and lambing from my family's large sheep and beef farm. In that my father's main principle of calving cows is as he would say "the less tinkering the better" translating to the less interference with the calving the better and only helping the cow to calve if really necessary.

Reproduction methods

Most of the herd 220 cows calve in the spring calving season, meaning the cows calve close to the time when grass begins to grow rapidly to maximize production from grazed grass, by far the most profitable feedstuff. They two calving seasons are both done in short compact periods of three to four weeks. This system allows more time to focus on general herd management. To simplify the maintenance of the herd and calving pattern, every year the late calvers, old cows and non-productive cows are culled and replaced by 40-60 of the best heifers that were bred on the farm. Maiden heifers are managed and bred to calve at the very start of the calving period, which aims to maximize their chances of staying in the herd for longer and increase their productive performance. After careful observation of heat during the first six days of the breeding season they are inseminated by easy-calving AI. All heifers not inseminated in the first six days receive a prostaglandin injection on the 6^{th} day and were inseminated following observation of heat in the next 4 days. Heifers that failed to come into heat following the first injection of prostaglandin receive a second injection about 10 days later. Heifers were again inseminated at a standing heat, or received fixed time AI at 72 and 96 hours after the second injection. This protocol

generally results in submission rates close to 100% and conception rates to first service of 70%.

Crossbreding

Autumn calvers and the first one hundred and eight of the spring calvers are bred with three Holstein-Friesian bulls to produce the farms own replacement heifers. The last 120 spring calvers are crossed with four different beef bulls two Herefords and two black Aberdeen-Angus and these crossbred calves are raised till about two/three weeks and then are sold to beef farmers.

Nutrition

They maximise the proportion of grazed grass in the herd's diet by extending the grazing season in early spring and late autumn. Paddocks are closed from 5th-10th of October, closing the farm in rotation, thereby ensuring the cows' calving pattern is matched to the start of the grass growing season i.e. they begin to calve at the onset of grass growth. They graze 30% of the paddocks in February, 66% by 17th of March and target 100% grazed by the 6th of April. The dry cows are all fed minerals during the dry period, and supplemental trace minerals are fed during lactation, especially where pasture and other feeds used on the farm are marginal or deficient.

Feed requirements of the milking cow

A cow will reach her highest daily milk output 6-8 weeks after calving but will only reach her highest intake of dry matter 10-12 weeks after calving. The cow will use energy from her fat reserves ('off her back') to make up the energy deficit for several weeks. However, if the cow loses too much body condition in early lactation, it can reduce her conception rate. Cows calving onto a grass-based diet will eat a total dry matter intake (DMI) of 8-10kg DM (grass + concentrates) in week one after calving. Intake will increase by 0.75-1.0kg DM every week until they reach a peak intake of 16-18kg DM during week 10-12 of the lactation. In spring, the aim is that the cow should graze a high amount of quality grass with appropriate supplementation. When less than 8kg of grass dry matter per cow is available, the deficit should be made up with forage e.g. grass silage, as well as

concentrate. This will ensure the cow is getting enough fibre. They stop feeding silage when enough fresh grass is available.

Soil sampling is carried out on a fifth of the farm each year and then they apply P, K and lime as recommended. They reseed some paddocks in spring when needed and possible with a target of a 60-day turnaround time from seeding to first grazing. The main trace mineral deficiencies that occur in Ireland are copper, selenium and iodine, with a lower prevalence of zinc, manganese and cobalt deficiencies. Deficiencies of these minerals are associated with poor reproductive performance, and also reduced milk production. Molybdenum also plays an indirect role, because high levels of molybdenum reduce the absorption of dietary copper.

Housing pre calving

The cattle were housed inside a total of three dry sheds with the calving shed holding 25 of the cows closest to calving and the other two sheds holding the rest of the dry cows with a system in that as the cows are calved and leave the calving shed they are replaced by the next cows closest to calving from the other two sheds and fed a total mixed ration starting six weeks before parturition to have good body condition. The ration was fed twice daily consisted predominantly of silage with minerals and a pre-calver mineral lick and water was available ad libitum.

I had the aid of high quality cameras in the calving shed (Sony Exmor IP System Dome type from IC Realtime, Citywest Business Campus, Dublin), which had the ability to move 360 degrees and zoom in giving a high quality real time picture received on my phone (Photo below).

Photo 1: The calving shed camera

I kept the cows under frequent observation mainly by eye during the day and by camera at night in order to detect the start of parturition. They were individually examined whenever 60 minutes for cows and 90 minutes for heifers had elapsed following rupture of the amniotic sac or progress was deemed to be slow and based on the dam´s behavior. If there was a situation of malpresentation I noted which type and then swiftly proceeded to correct it and extracted the calf.

I found that the malpresentations were generally straight forward to recognize as first of all the cow is unable to calf without assistance. While a cow was calving one could only see one forelimb appearing outside the vulva instead of two, meaning that the second forelimb was obstructed in some way for example by carpal flexion.

The malpresentations always needed correction to allow the cow a real chance to calve. The size of the calf made the correction more difficult, the bigger the calf the bigger the job to correct the malpresentation. I found that breech (Hip Flexion) malpresentation was

the hardest to correct and also the most risk in tearing the uterus as the hind limbs are harder to manipulate than the forelimbs therefore it took massive patience and a lot of sweat to correct it.

Table 10: Total bred with Holstein-Friesian & beef bulls

	Cow	Heifer	Total	Total Calving %
Total Number of Calver	256	52	308	-
Bred by Holstein-Friesian bulls	166	22	188	61%
Bred by Beef Bulls	90	30	120	39%

CHAPTER 4: RESULTS

In total 96 required some form of assistance which is 31% of the total as seen in table 11 and all 6 twin births needed assistance. The majority of calves (n=251) were born in anterior presentation while 57 calves came in posterior presentation. The posterior presentation was much more likely to cause some sort of dystocia. Stillbirth at a total of 15 had a relatively low prevalence of 4.9% due to the good reproductive management, nutrition and assistance during the calving seasons. Only 5 stillbirths were unassisted and these seem to have been born death. Among the assisted 10 stillbirths, 4 were born death and 6 lived for about 24 hours postpartum, however unfortunately one of these was killed by the mother.

Table 11: Results in general

	Cow	Heifer	Total	Total Calving %	Stillbirth %
Total Unassisted	191	21	212	69%	2.4%
Total Assisted Calving	65	31	96	31%	10.4%
Anterior Presentation	206	45	251	82%	3.6%
Posterior Presentation	50	7	57	18%	10.5%
Twins	6	0	6	2%	16.7%

The prevalence of foetal malpresentation in dairy

Autumn calvers and the first one hundred of the spring calvers that were bred with the Holstein-Friesian bulls had a lower need for assistance as shown in table 12 than the last 120 spring calving cows which were crossed with beef bulls in table 13. Malpresentation proved to be the third highest cause of dystocia with narrow pelvis (mainly in Heifers as expected) and incomplete dilation of the cervix slightly higher.

Table 12: Cow and heifer calving with Holstein-Friesian bulls (n = 188)

	Cow	Heifer	Total	Assisted Calving %
Total Assisted	32	15	47	-
Anterior Presentation	*22*	*12*	*34*	*72.0%*
Posterior Presentation	*10*	*3*	*13*	*38.0%*
Malpresentation	8	2	10	21.5%
Narrow Pelvis	1	11	12	25.5%
Cervix Incomplete Dilation	12	0	12	25.5%
Fetal Oversize	3	1	4	8.5%
Uterine Inertia	7	0	7	15%
Uterine Torsion	2	0	2	4%

Table 13: Assisted cow & heifer calving with beef bulls (n = 120)

	Cow	Heifer	Total	Assisted Calving %
Total Assisted	33	16	49	-
Anterior Presentation	*20*	*12*	*32*	*65.0%*
Posterior Presentation	*13*	*4*	*17*	*35.0%*
Malpresentation	9	3	12	24.5%
Narrow Pelvis	0	9	9	18.5%
Cervix Incomplete Dilation	8	0	8	16.5%
Fetal Oversize	9	4	13	26.5%
Uterine Inertia	5	0	5	10%
Uterine Torsion	2	0	2	4%

The prevalence of foetal malpresentation in dairy

Anterior presentation was by far the most common at 251 compared to 57 in posterior presentation. Table 14 shows the anterior presentations with details of the degree of assistance required based on the types of dystocia.

Table 14: Anterior presentation (n = 251)

	No Assistance	Total Assistance	Assistance 1 Person	Assistance 2 People	Assistance > 3 people/calving Jack
Total	185	66	21	19	26
Malpresentation	-	18	5	5	8
Narrow Pelvis	-	15	3	4	8
Cervix Incomplete Dilation	-	15	7	4	4
Fetal Oversize	-	10	0	4	6
Uterine Inertia	-	4	2	2	0
Uterine Torsion	-	4	4	0	0

Table 15 shows the posterior presentations with details of the degree of assistance required based on the types of dystocia.

Table 15: Posterior presentation (n = 57)

	No Assistance	Total Assistance	Assistance 1 Person	Assistance 2 People	Assistance > 3 Person/calving Jack
Total	27	30	6	9	15
Malpresentation	-	4	0	0	4
Narrow Pelvis	-	6	0	1	5
Cervix Incomplete Dilation	-	5	2	3	0
Fetal Oversize	-	7	1	2	5
Uterine Inertia	-	8	3	3	1
Uterine Torsion	-	0	0	0	0

The prevalence of foetal malpresentation in dairy

Twins were the most likely to have a malpresentation at 100%, either one or both of the calves which is presented in table 16.

Table 16: Twins (n = 6)

	No Assistance	Total Assistance	Assistance 1 Person	Assistance 2 People	Assistance >3 Person/calving Jack
Total	0	6	2	3	1
Malpresentation	-	6	2		1
Narrow Pelvis	-	0	0	0	0
Cervix Incomplete Dilation	-	0	0	0	0
Fetal Oversize	-	0	0	0	0
Uterine Inertia	-	0	0	0	0
Uterine Torsion	-	0	0	0	0

Table 17: Malpresentation types cow and heifer calving (n = 22)

	Cow	Heifer	Total	Malpresentation Type %
Malpresenation	17	5	22	-
Lateral Deviation of the head	5	0	5	22.8%
Downward Deviation of the Head	1	0	1	4.5%
Unilateral Carpal Flexion	3	1	4	18.2%
Unilateral Shoulder Flexion	2	1	3	13.6%
Incomplete Extension of the elbow	1	1	2	9.1%
Hock Flexion	1	1	2	9.1%
Hip Flexion (Breech)	2	0	2	9.1%
Oblique Dorso-Vertical Presentation	1	1	2	9.1%
Malposition lateral (Right side)	1	0	1	4.5%

The prevalence of foetal malpresentation in dairy

The total prevalence of malpresentation was 22 which are 23% of the total dystocia cases. The most common type of malpresentation was abnormal posture of the head mainly lateral deviation of the head 22.8% but also downward/upward deviation of the head occurred 4.5%. Then abnormal postures of the front leg unilateral carpal flexion 18.2%, unilateral shoulder flexion 13.6%, incomplete extension of the elbow 9.1%. After those abnormal postures of the hind leg, included hock flexion posture 9.1%, hip flexion posture also called breech 9.1%. Then malpostion lateral (Right) 9.1% and oblique dorso-vertical presentation 4.5%.

CHAPTER 5: DISCUSSION

Assistance

In Dairystream 31% of the calvings needed assistance in some way. In dairy cattle the international prevalence of dystocia is reported to range from 2% to 22%, while the amount of calvings needing assistance was higher, ranging from 10% to 50% [19]. In beef cattle assistance of some form at 18% was reported by Colorado State University [5].

Malpresentation

The prevalence of malpresentation recorded in Dairystream was 21% in comparison to other studies, for example an abnormal foetal presentation, position, and posture account for 1 to 16% of dystocias observed by [14]. Of the 373 dystocia deaths in anatomically normal calves, 121 (32.4%) had malpresentations [20]. In dairy, malpresentations were observed as the most frequent cause of dystocia by many authors for example 39.8% [11] and 46.77% by Veterinary Hospital Brasilia 2002 to 2009 [12]. In beef cows thirty one similar findings were recorded by TVCC [5]. However, it was reported that malpresentations added up to only 1% of the total number of calvings by [13]. Teaching Veterinary Collage of Hassan reported malpresentations at 38.3% and that it was the most common cause of dystocia [15]. TVCC conducted two studies, the first study recorded

malpresentations at 25% and their second was 39% [17], both were higher compared to Dairystream data of 21%. Other studies reported 3.0% [21], 7.6% [22], 11.6% [23], 16.1% [24], 24.6% [25], 26.0% [26], 27.3% [27], 34.4% [28], 37.5% [29], 38.4% [30]. Purdue University Veterinary Teaching Hospital reported malpresentations at 16.8% [18]. The average of all these results on the prevalence of malpresentation is approximately 24% of dystocia cases, making it an extremely important factor for the management of a successful dairy operation.

Breed effect on dystocia and malpresentation

Teaching Veterinary Collage of Hassan dystocia cases in dairy cattle showed a low foetus oversize rate at 5% and high rate of malpresentations at 38.33% [15]. In beef cattle based on the breed Angus 2.8%, Charolais 2.9%, Simmental 3.2%, Gelbwieh 3.3%, Limousine 4.4%, Red Angus 5.5%, Hereford 6.6%, Maine Anjou 7.1% reported by Colorado State University [5]. Two studies by TVCC showed the prevalence of dystocia by breed of the dam. In which the first study Jersey 16.67%, local breeds 20.83% and crossbred 62.5%. The second study Holstein Friesian 2.5%, Jersey 14.6%, local non-descript breed 17.2% and crossbred 65.6% [17]. Purdue Veterinary Teaching Hospital reports on 155 beef cattle cases of dystocia. Foetus-pelvic disproportion affected 110 animals at 71.0% and 26 animals were affected by malpresentations at 16.8% [18]. In Dairystream the Holstein-Friesians were bred with two different types of sire. One hundred and eighty eight bred with Holstein-Friesian bulls required less assistance at 25% compared to the one hundred and twenty crossed with beef bulls which required more assistance at 40.8%. The data showed clearly that foetus oversize was the main dystocia consequence of breeding by the beef bulls with a foetus oversize of 26.5% compared to ones bred by the Holstein-Friesian bulls at 8.5%.

Primiparous and multiparous dams

In general it has been said that causes of dystocia are foetus-pelvic disproportion, malpresentation, and maternal problems [2]. Perhaps obvious that dystocia prevalence in primiparous dams is most often due to foetus-pelvic disproportion, whereas dystocia in multiparous cows is more frequently due to malpresentation or maternal problems. A possible reason for increase in calf dead is herd size as cows are not managed as well in

larger herds [3]. Among two studies carried out by the TVCC the first one showed no difference in narrow pelvis as a cause of dystocia between a cow and a heifer at 8.33%. The foetus oversize was only in cows at 4.17%. The malpresentations showed a big difference in heifers at 12.5%, cows at 50%. The second study showed a difference in narrow pelvis at 7% in heifers and 5.73% in cows. The foetus oversize was higher in cows at 6.37% than heifers at 3.18%. The malpresentations also showed a big difference in heifers at 8.28%, cows at 30.58%. The data in Dairystream showed a higher need for assistance in heifers at 59.6% and lower assistance in cows at 25.4%. Narrow pelvis was a problem with 1.5% of cows and 64.5% of heifers. Foetus oversize was similar in cows and heifers at 18.5% and 16.1% respectively. Malpresentations were higher in cows at 26.2% than in heifers at 16.1% [17].

Anterior & posterior presentation

Anterior presentation was by far the most common with 251 calvers compared to 57 calvers with posterior presentation. Anterior malpresentations were at 27.3% whereas posterior malpresentaions were at 13.3%. The prevalence of dystocia with posterior presentation in dairy cows varied from 3.8-17% [4, 11]. In the Veterinary Medicine Collage of Iraq the cases of dystocia were mainly anterior at 75.9% and posterior at 24.1% [14]. Colorado State University beef cattle records showed that the anterior malpresentations added up to 17.7% and the posterior malpresentations added up to 82.3%. However, this study classed posterior dorsal as a malpresentation which was 72.8% of the posterior malpresentation [5]. Most authors include posterior dorsal as a normal presentation.

Twin births

There was a 100% need for assistance due to malpresentation in twin births at Dairystream. In the study between 1994 and 2004 by the US Meat Animal Research Center on the effects of increasing foetal numbers and their distribution between the left and right uterine horns. Malpresentations were 7.8% in singles and 43.3% in twins [16].

Head Deviation

Head deviation was the most common cause of malpresentation in cattle 20.4% [11]. Also at Dairystream head deviation proved to be the most common type of malpresentation.

The prevalence of foetal malpresentation in dairy

Head deviation in studies varied from 2.5-20.4% [11, 5, 13] and 38.9% [6]. Calving studies in Iraq 14.6% suffered from malposture of the head flexed to the right, 12% with malposture of the head flexed to the left, 0.8% with malposture of the head flexed ventrally, 0.4% with malposture of the head flexed dorsally [14]. Colorado State University reported lateral deviation of the head at 2.5%. Although in this study posterior presentation was included as a malpresentation [5]. In two studies by TVCC they reported head deviation at 12.50% and their second study at 12.74% [17]. The average of all these results on the prevalence of deviation of the head is approximately 20% of malpresenations compared to Dairystream at 29% which recorded mainly lateral deviation of the head 22.8% and downward deviation of the head at 4.5%.

Forelimb flexion in general

The second most frequent malpresentation was limb flexions at 19.4% reported by a retrospective analysis of 156 cases [11]. The college of Veterinary Medicine Iraq had malposture of the forelimbs at 14.6% [14]. The averages were approximately 13% forelimb flexions at Dairystream.

Carpal flexion

Carpal flexion was the most common form of forelimb flexion at 18.2% in Dairystream. Colorado State University showed carpal or shoulder flexion at 11.4% [5]. In the study by TVCC they reported carpal flexion at 8.4% and their second study carpal flexion at 8.9% [17].

Shoulder flexion

Dairystream recorded shoulder flexion at 13.6%. Colorado State University showed carpal or shoulder flexion at 11.4% [5]. In the studies by TVCC their second study reported shoulder flexion at 5.1% [17].

Incomplete extension of the elbow

At Dairystream incomplete extension of the elbow was 9.1%. Colorado State University showed incomplete extension of the elbow at 1.9% [5].

Hindlimb flexion

The prevalence of foetal malpresentation in dairy

Calving studies in Iraq reported 14.6% malpostures of the hindlimbs [14]. Overall in Dairystream both hip flexion and hock flexion were common at 9.1% each.

Hock flexion

At Dairystream the occurrence of hock flexion was 9.1%. TVCC the patterns of malpresentation in two different studies reported hock flexion at 4.2% and their second study at 6.4% [17].

Hip flexion (breech)

Breech occurred at 9.1% in Dairystream. TVCC identified hip flexions at 5.73% [17]. Breech presentation in beef cows at 8.2% recorded by Colorado State University [5], however, a retrospective analysis of factors contributing to calf mortality and dystocia in beef cattle recorded [13] only one breech presentation out of 20 abnormal births.

Dorso-vertical (oblique) presentation

In Dairystream the dorso-vertical (Oblique) was recorded at 4.5% which was just one case. It is very rare in cattle and more common in horses [31].

Malposition lateral (right)

The normal position is dorsal upright, abnormal lateral position occurred in Dairystream at 4.5% which was just one case. The literature review has no cases on the occurrence of malposition lateral.

Longitudinal posterior presentation ventral position

In Dairystream there were two cases of longitudinal posterior presentations ventral position. Colorado State University also reported two cases of posterior presentation ventral position [5]. Calving studies in Iraq a study also reported two cases of posterior presentations ventral position [14].

Ventro-vertical (oblique) malpresentation

Colorado State University recorded only one case of ventro-vertical malpresentation [5]. Dairystream had no case of ventro-vertical malpresentation.

The prevalence of foetal malpresentation in dairy

Stillbirths

At Dairystream there were a total of 15 still births out of a total of 308 which is 4.9%. Only 5 stillbirths were unassisted and these seem to have been born death. Among the assisted 10 stillbirths in whom 4 were born death and 6 lived for about 24 hours postpartum, however unfortunately one of these was killed by the mother. Posterior had the highest percentage of stillbirths at 10.5% compared to anterior at 3.6%. One of the twins was born dead.

General prevention of problems with malpresentations

Very attentive supervision of calving is recommended. Cows or heifers in labour for extended periods should be examined. Usually malpresentations will be easier corrected when the dam is in the standing position as this allows the calf to be pushed back. Once the malpresentation is corrected, delivery is best achieved with the cow in full lateral recumbency as, in that position, the pelvis is at its maximum diameter [32]. In addition the length of time in labor and the quality of contractions are indicators of malpresentation, a twin birth, or a metabolic problem [33].

The physiology of malpresentations

The physiology of malpresentations does not seem to be fully understood. Nevertheless, around the seventh month of gestation the presentation is either anterior or posterior and the reversal should not happen as the length of the foetus is longer than the diameter of the amnion [19], however [34], reversal could occur up to two days before parturition. It was reported that the endocrine system of the foetus might decide the presentation at a certain age [35]. Most foetuses are in a ventral or lateral position in the last week of gestation without regard for the presentation [36, 37]. During the first stage of parturition, the foetus must turn to a dorsal upright position this is thought to be achieved by the force of myometrial contractions. Therefore if a calf is in the ventral position it may be a consequence of weak maternal myometrial function. However it could just be a consequence of the foetal attempts to be in the right position for calving [38]. These changes in position from ventral to dorsal and the body parts like the head, neck, forelimbs and hindlimbs going from flexed to being extended occur about 3 days before parturition.

It occurs in an increasing fashion to peak activity level, this event is called the righting reflex [39]. The righting reflex completes within one day. If however there were any insufficiencies in the foetal muscles it could affect the righting reflex leading to for example a ventral position [38]. Furthermore malposture like shoulder flexion or carpal flexion could occur if the foetus muscle activity is not up to speed [40]. Prolonged parturition could also be a cause of these posture problems as if the foetus is starved of oxygen this may stop or reduce the foetal muscle activity [41].

Impacts of dystocia

Excluding the costs associated with increased culling, other management costs and veterinary costs. Dystocia in confinement systems impacts production (41% of costs), fertility (34%) and cow and calf morbidity and mortality (25%) [42]. Dystocia has huge effect on the future of cow fertility as shown in a Canadian study [43], by increased risk of retained placenta and metritis [44] in addition it increases the chance of digestive disorders, respiratory problems and subsequent decrease in milk yield [45]. A dystocia cow is more likely to experience dystocia again [46]. Dystocia costs are four times greater than the treatment costs [47]. The most frequent complication was retained placenta 37.4%, followed by lochiometra 16%, vaginal wounds 12.2%, pelvic phlegmons 16% and neurotripsy 4.6%. Pelvic phlegmon needed the most post-operative care days at 14, it took 13 days to cure retained placenta and 9 days for lochiometra [6].

Management systems in dairy

Management systems of dairy farms vary internationally between pasture only (e.g. New Zealand), pasture and confinement (e.g. Ireland) and confinement zero-grazing systems (e.g. North America, Canada). In some countries organizational regulations may determine the calving setup, e.g. in Sweden dedicated calving pens must be provided by law and under organic regulations cows must calve in an individual pen; not tied-up [48]. Differences between the health and welfare based on different management systems, including calving performance, tend to be better in pasture compared to a confinement system [49]. Dairy cows in tie stall housing have been reported to have a higher rate of dystocia [50]. However, it is not just the management system but the management of the system which is also critical to calving success [51].

CHAPTER 6: CONCLUSION

Malpresentations recorded in Dairystream were 21% of dystocia cases and other studies averaged at approximately 24%, making it an extremely important factor for the management of a successful dairy or beef operation. Holstein-Friesian dairy cows crossed with beef bulls showed a higher degree of malpresentations than those crossed with Holstein-Friesian bulls. Nevertheless, the data also showed clearly that foetus-pelvic disproportion was the main dystocia consequence of breeding with beef bulls. Perhaps obvious that dystocia prevalence in primiparous dams is most often due to foetopelvic disproportion, whereas dystocia in multiparous cows is more frequently due to malpresentation or maternal problems. The prevalence of malpresentations showed a big difference between cows and heifers, heifers at an average of 12% and cows at 35%. The effects of increasing numbers i.e. twin births showed a massive increase in malpresentations.

The anterior malpresentations namely involving the head or the forelimbs of the foetus were the most common with head deviation being the most frequent type of all malpresentation. The average of all these results on the prevalence of deviation of the head was approximately 20% of malpresenations compared to Dairystream at 29% which recorded mainly lateral deviation of the head also downward deviation of the head. The second most frequent malpresentation was carpal flexion, after that shoulder flexion then incomplete extension of the elbow.

Among the posterior malpresentations the most frequent were hock flexion and then hip flexion (breech). The other types of malpresentations were almost irrelevant, for example dorso-vertical (oblique) presentation is very rare in cattle and more common in horses, there was only one case at Dairystream.

Very attentive supervision of calving cows is recommended. Cows in labour for extended periods should be examined. Usually malpresentations will be easier corrected when the cow is in the standing position as this allows the calf to be pushed back. Once the malpresentation is corrected, delivery is best achieved with the cow in full lateral recumbency as, in that position, the pelvis is at its maximum diameter.

CHAPTER 7: BIBLIOGRAPHY

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