Review on Economic Impacts of Dystocia in Dairy Farm and Its Management and Prevention Methods

Abriham Kebede*, Abdella Mohammed, Waktola Tadessse, Dereje Abera

School of Veterinary Medicine, College of Medical and Health Science, Wollega University, P.O. Box, 395, Nekemte, Ethiopia
Contact address: E-mail:abrahamkebede2016@gmail.com, Mobile phone no=+251-917-095-077

Abstract: Reproductive problems occur frequently in dairy cows and can dramatically affect reproductive efficiency in a dairy cows. Among the most common reproductive disorders that have direct impact on reproductive performance of dairy cows is dystocia that can result impaired reproductive function. Dystocia come from the Greek words "dys" meaning "difficult, painful, disordered, and abnormal" and "tokos" meaning "birth." Dystocia is defined as difficulty or prolongation of parturition as opposed to normal parturition. Calving difficulty causes trauma for both cows and their offspring, and can lead to increased rates of uterine infections, per parturient disorders such as retained placenta, metritis, longer calving intervals, lower milk production, and reduced health of cows and survival of newborn calves. Calves that survive the trauma of a difficult birth (dystocia) have higher mortality and morbidity in the neonatal period. Some evidence also exists that dystocia could have long-term effects on the performance of dairy heifer calves, in addition to higher mortality and morbidity. Most frequent causes for difficult calving are calf's birth weight and sex of calf, age, body weight, condition and parity of cow, breeder and environmental factors. The diagnosis of dystocia is based on the history and physical examination. Dystocia can be managed through: manual assistance, fetotomy and cesarean section. It is prevented through: Management of Breeding Heifers and Cows, Selection of Easy Calving Sire and Induction of Parturition. Generally, dystocia is reproductive problem that affects production and reproduction. Therefore managemental practices should be appropriately applied in dairy farm.

[Abriham Kebede, Abdella Mohammed, Waktola Tadessse, Dereje Abera. **Review on Economic Impacts of Dystocia in Dairy Farm and Its Management and Prevention Methods.** *Nat Sci* 2017;15(3):32-42]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). http://www.sciencepub.net/nature. 4. doi:10.7537/marsnsj150317.04.

Key words: dairy cow, dystocia, Parturition and Reproductive problems

Introduction

Reproductive efficiency is a critical component of a successful dairy operation and acts as an important component of a profitable dairy farm, whereas reproductive inefficiency is one of the most costly problems facing the dairy industry today. Reproductive problems occur frequently in dairy cows and can dramatically affect reproductive efficiency. Among the most common reproductive disorders that have direct impact on reproductive performance of dairy cows such as: abortion, stillbirth, metritis and retained placenta; dystocia is the leading disorder that can results in impaired reproductive function [1].

Dystocia from the Greek word "dys" meaning "difficult, painful, disordered, abnormal" and "tokos" meaning "birth." Dystocia is difficult or abnormal labor or delivery in which heifers or cows are unable to calve without assistance [2, 3]. Dystocia is defined as difficulty or prolongation of parturition as opposed to eutocia, i.e. normal parturition and requires assistance varying from slight to extreme during delivery. Although no clear boundaries exist between eutocia and dystocia we can define dystocia as prolonged or difficult birth, when the first or the second stage of labor is prolonged and requires more assistance than desirable to deliver the calf [4, 5].

Parturition is a stressful process for cows and their calves. Abnormal parturition further exacerbates the stress [6]. Dystocia or difficult calving has been a long-standing problem in dairy industry. It is a leading factor of calf death at or shortly after birth and also results in uterine infections, retained placenta, and longer calving intervals. It has been estimated that between 2 and 23% of cows in a herd experience difficult calving that require farmer or veterinarian assistance [7].

Calving difficulty causes trauma for both cows and their offspring, and can predispose to increased rates of uterine infections, per parturient disorders such as retained placenta, metritis, longer calving intervals, lower milk production, and reduced health of cows and survival of newborn calves [8, 9, 10].

Calves that survive the trauma of a difficult birth (dystocia) have higher mortality and morbidity in the neonatal period [11, 12]. Some evidence also exists that dystocia could have long-term effects on the performance of dairy heifer calves, in addition to higher mortality and morbidity. Production losses are greatest in high yielding cows and in early lactation, possibly associated with reduced dry matter intake [13]. Recent Canadian studies show that dystocia has the greatest effect on future cow fertility [14] through

increased risk of retained placenta and metritis [15] in addition to the effects on cow culling [16] and on stillbirth [17].

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) [18]. Season is correlated with birth weight of calves. Extremely low and high temperatures reduce birth weight [19]. Breeder has considerable effect on calving. Regularly observations of animals, offering help and proper place for calving reduce calving problems [20].

Dairying as a component of livestock production is an important economic activity in sub-Saharan Africa including Ethiopia. In order to improve the low productivity of local cattle, selection of the most promising breeds and crossbreeding of these indigenous breed with high producing exotic cattle has been considered as a practical solution. When crossbreeding of indigenous cattle with exotic breed the economic traits such as: birth weight of both the cow and calve and milk productivity of the cows increase. But, another important trait "easy calving" decreases inversely as the weight of calves increase. While selection most individuals do not consider on easy calving trait, rather they mainly focus on the weight of calves which is finalized by undesirable result dystocia. Therefore the aim of this seminar paper is to highlight: The economic impacts of dystocia in dairy cows, Risk factors associated with dystocia and Some managements and control strategies of dystocia [21].

Dystocia

Dystocia (calving difficulty) is becoming a greater concern for cattle breeders, because of the increased emphasis on rapid growth rates and improved cow efficiency. Today dairy cattle breeders in the whole world are facing increasing problems caused by dystocia which represents also a major cause of mortality in calves and greatest source of expenses of all veterinary interventions [22, 23]. Calving difficulty, along with increased calves' mortality, is a considerable source of economic losses for cattle breeders which results in reduced fertility and reduced bovine production [24, 25, 26].

Calf death loss at birth is about 5% if calving is normal but Calving difficulty increases mortality to high level up to 20% which contradict with the aim of breeders 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. Therefore proper breeding before, during and after calving are the key to prevent the problems [27].

Etiology

From, a clinical perspective, there are many factors that can contribute to dystocia and for a better understanding these factors they can be usually divided in two groups: maternal or fetal factors [28, 29].

Maternal Causes

Problems with the dam that impede or prevent delivery include a lack of expulsive force, incomplete cervical dilatation, irreducible uterine torsion, pelvic deformities and uterine tear. The causes of these are complex and not completely understood. But sometimes hormonal imbalances may result in the cervix not being completely dilated or uterine contraction not occurring frequently or strongly enough. Low calcium level such as seen with milk fever may be responsible. The cause of uterine torsion is unknown but sometimes associated with uterine instability and excited exercise [30, 31, 32].

Fetal Causes

Broadly, the fetal origin of dystocia can be divided generally into the abnormal 3p's and excessive fetal size relative to the maternal pelvis (fetopelvic disproportion) [33]. The normal delivery is made longitudinal, in the anterior presentation, dorsal sacral position; with bilateral foreleg extension [34]. Deviation of the head and flexion of the various joints in anterior presentation, flexion of both hind limbs (breech) in posterior presentation, or twins may cause dystocia [35]. Fetal monsters arise from adverse factors affecting the fetus in the early stages of its development. The adverse factors are mostly of genetic origin but may also include physical, chemical and viral factors. But fetal monsters are relatively uncommon and are sporadic in occurrence and the incidence is higher in cattle than in other species [36].

Epidemiology

The incidence of dystocia in cattle has been widely studied because of its effects on productivity. It is less common in dairy than in beef cattle. In relation to parity, there were 66.5%, 23.1% and 14.3%assisted deliveries in 1, 2 and 3 calving respectively [37]. Dystocia also varies with management system. Significantly lower dystocia rates have been reported at pasture compared to when cows are housed [38]. The results reported here for pasture-based dairy herds show a similar calving assistance rate (31.1% vs. 26.9%), but a substantially lower dystocia rate (6.8% vs. 13.7%) to that recorded in confinement management systems [39]. The overall incidence of dystocia varies with the species and with breeds within the species. The bovine species are most often affected. Maternal dystocia occurs less frequently than fetal dystocia and has recorded 85.5% of fetal dystocia and 14.5% maternal. Dystocia is more common in

primipara than multipara and in male than female calves [40].

Risk Factors of Dystocia

Fetomaternal (fetopelvic) disproportion

Among all factors that might cause dystocia, FMD is the primary cause of bovine dystocia. In cattle, it has been estimated that 46% of all cases of dystocia are caused by fetomaternal disproportion. FMD is not only a factor by itself but a relationship between maternal and fetal factors and can be defined as an obstruction of calf expulsion originated by the calf size/birth weight or pelvic dimensions of the dam, that may have several factors in its origin. Genetics also influences the incidence of fetomaternal disproportion in cattle. The existence of differences in pelvic size among different breeds seemed to be due to differences in cow body weight, although a tendency for larger pelvic openings in larger cows was found [41, 42].

Gestation length

Gestation length is having an indirect effect on calving difficulty as an increase in gestation length is increasing the BW [43]. Gestation length itself is influenced by parity, fetal gender, sire and dam effect, maternal nutrition and climate during the last trimester of gestation. It varies from an average of 279 days in Holstein Friesian to 287 days in Charolais. So choosing a bull with a relatively short gestation length can help to avoid difficult calving [44, 45].

Sex of calf

The majority of the increase in dystocia rate for male calves is attributable to higher body weight and frequently also have longer gestational periods which leads to bigger or heavier calves. However, morphology also contributes to increased risk of dystocia [46, 47]. In the USA Holsteins the percentage of dystocia cases was 28.0% for heifers giving birth to male calves and only 6.0% for second-parity cows giving birth to female calves [48].

Table 1. The relative frequencies of dystocia severity in Angus heifers at different ages

Age of dam in months.	Sex of calf	Total number of calvings	%Some assistance	% Difficult Calving
< 23	M	7543	21.0	6.2
< 23	F	7909	13.0	2.6
24–25	M	48 859	7.2	4.0
24–25	F	49 557	8.1	2.1
26–27	M	16 892	6.0	3.0
26–27	F	16 716	6.5	1.3
28–29	M	6448	8.7	2.6
28–29	F	6473	5.5	1.4
> 29	M	4018	8.0	2.0
> 29	F	4027	4.4	0.7

Source: [49].

Age and parity of dam

Age of the dam also has been demonstrated to be an important contributor to calving difficulty [50], especially the difference between multi- and primiparous dams. First calf heifers account for the majority of calving difficulties and associated calf losses [51], and it is generally known that first and second calf animals experience more calving difficulties compared to mature cows, even though the first and second calf animals produce lower birth weights [52, 43]. Experiments showed a rate of dystocia of approximately 12%, 2%, 0.3%, and 0.5% in 2, 3, 4 and 5 years old cows respectively [32]. This may be due to poor pelvic development that can be found in 2 years old heifers which often is not fully compensated by a smaller calf [53, 54].

Breed and size of dam

The incidence of dystocia generally is influenced by factors such as breed of the sire, breed of the dam, age of the dam, number of fetus and body weight of the dam [55]. The prevalence of dystocia can be predicted for typical case. Some results show that some cows are more likely to have dystocia at successive calving than other cows. The detection of this small but significant cow effect is supported by the existence of a significant direct and maternal heritability for calving difficulty with high genetic correlations between dystocia at first and second calving [56]. Some breeds have a tendency for increased gestation length and for bigger or heavier calves in proportion to the maternal pelvic area. Consequently, these breeds typically appear on surveys with higher incidences of dystocia when compared with other breeds, like 6% in Holstein Friesian, 9% in Charolais or 80% in Belgian Blue heifers [57, 23].

Management system (Nutrition) of cow

Dairy cow management systems vary internationally between pasture only, pasture and confinement and confinement only; these systems vary in the genotype of the animals, their diet, their environment and their management, all of which can

impact the risk of dystocia [58]. Regarding the possible differences between management systems, health and welfare, including calving performance, tend to be better in pasture compared to a confinement system [59]. Higher dystocia rates in dairy cows have been reported in tie stall housing [38, 60], possibly due to inadequate exercise and mobility and psychological stress. Nutrition of the dam also has a considerable effect on dystocia. Nutritional effects may be mediated by affecting the bodyweight of the calf or the size of the heifer. When the dam is in poor condition, from being poorly fed, they deliver low viability calves, whilst overfed dams tend to deliver oversized or weighted calves. Both situations increase the risk of dystocia [61].

Down regulating the size of the fetus by restricting the dam‘s feed intake during a limited period of pregnancy was suggested to be used as a method to decrease calving difficulties. This should however be without impairing the calf‘s post-natal growth or the growth and rebreeding performance of the dam because that will lead to the loss of the advantage of decreasing dystocia [62]. Beef cows experience significantly more dystocia than dairy cows because of high fat accumulation in their birth canal which makes parturition more difficult, leading to fatigue of the musculature of the uterus [45].

Geographical location (season of the year)

Season of the year and some other environmental factors, like air temperature and wind chills, have been shown to influence calves’ birth weight. Calf birth weight is greater in colder environments compared with warmer climates. Heavier calves of about 4.5kg are expectable in spring, after severe winter temperatures and that may be due to an increased blood flow to the uterus during cold winters, with subsequent increase in the nutrient supply to the fetus, resulting in an increased birth weight [53, 41, 42].

Hormonal factors

Although little information is available concerning the hormonal influences on calving difficulty, abnormalities in hormone profiles during pregnancy and at parturition will cause dystocia [63]. Some hormones that have been studied include: relaxin, prolactin, estrogens and progesterone. Research with relaxin has indicated a potential beneficial effect on cervical dilation, pelvic area and subsequent parturition in beef heifers. Administration of estrorelaxin into the cervix during late pregnancy has resulted in cervical dilation and elicited an increased pelvic area growth rate without inducing premature birth. Other researchers have looked at prolactin levels and found lower pre- and postpartum plasma concentration levels in females experiencing dystocia than in normally calving cows. In addition, estrogen excretion rates were lower in dystocia cases than controls, but progesterone levels were similar in all cows [64].

Diagnosis

The diagnosis of dystocia is based on the history and physical examination. In cases of FMD vaginal examination is often difficult. However, when called for acting on a dystotic labor, one must remember that all kinds of dystocia are possible, and that during clinical approach, some steps must be followed. Therefore, when called, a brief history of the case should be asked to the owner [36; 65]. Upon arrival at the farm this information is completed by inquiring for additional details about the clinical history to obtain as much pertinent history as possible and this should include: the expecting calving date (gestation length), information about the sire, if the cow is first calving or not, about previous calving, for how long is the cow in labor, if there was any progress in calving; Some other questions about the recent health of the cow should also be asked [5].

Before starting the clinical examination, focusing on the following: physical condition and BCS of the cow; is the cow standing or recumbent; brief physical examination; if there are any membrane or fetal part visible in the vulva; if so, identify the membrane and its condition or the fetal presentation and position; is there any vaginal discharge that may indicate, for example, fetal death [42; 36].

After wards, one should follow to the obstetric examination per vaginum, where cleanliness and lubrication should prevail. After washing the genital parts of the cow and the arms and hands of the obstetrician, the internal examination starts. During this examination the vagina, vulva and the uterus should be checked for possible injuries, to ascertain the dilatation of the cervix and finally the position, viability and size of the calf [65; 31]. When stenosis of the cranial vagina is detected during the vaginal examination, a rectal examination is also indicated to confirm the existence of uterine torsion. If the obstetrician suspects an FMD the vaginal examination continues with a lubricated hand to feel the parts of the calf near the pelvis of the mother, and then must be moved in a circular fashion around the calf in order to estimate the space between the calf and pelvis [5].

Treatment

Manual Traction

Pulling on a calf should only be done when the normal presentation and posture of the calf are observed. This applies either to an anterior or a posterior presentation. The anterior (forward) presentation in dorsal position and extended posture is the most normal situation at calving, which means that the calf appears with the forelegs first, followed by the head and then the rest of the body and the hind limbs at the end. This is usually the first approach in a

simple FMD case if the wideness of the birth canal is sufficient [29].

To perform a controlled traction, obstetric chains or ropes around the pastern of the calf can be used or, in more complicated cases, a mechanical fetal extractor. Whatever the traction source used, it is always important to use ample lubrication. In cases of excessive or uncontrolled traction some problems are expected for the dam, like damage of the pelvic nerves, laceration or contusion of the soft tissues, and sacral displacement or fracture. Consequently, one should be aware of the risks, to avoid complications. The extractive force should be only applied simultaneously with the dam's abdominal press, releasing the tension when she ceases to strain [42; 65].

Fetotomy

Fetotomy is defined as those operations performed on the fetus for the purpose of reducing its size by either its division or the removal of certain of its parts. It is indicated in oversized fetus, abnormalities in presentation, position, or posture or a combination of these which cannot be corrected by mutation, when the fetus is emphysematous and the dam is toxic, fetotomy is generally recommended in preference to c-section when the required operation is simple, involving only one or two procedures. In cases where more complicated fetotomy procedures would be required, a caesarean section should be recommended [66].

The advantages of fetotomy are: avoids the major abdominal surgery of caesarean section, less assistance required than caesarean section, shorter recovery time/less aftercare and less cost [30] and it's disadvantages are: it may be dangerous, causing injuries or lacerations to the uterus or birth canal by instruments or sharp edges of bone; and also it may take a long time causing exhausting of both the dam and the operator [33]. A case where the calf is already dead, fetotomy is the method of choice due to optimal cow survivability [67].

Fetotomy can be complete, when a whole fetus is divided into smaller pieces, or partial, when a small part of the fetus, such as a leg, is removed [40]. In general fetotomy should not be attempted unless: proper fetotomy instruments such as: Fetotome, a wire-saw and a wire introducer, handgrips and a threader are available. To perform Fetotomy veterinarian should also make sure if there is adequate space in the birth canal for introduction and alignment of the fetotome, the patient can be restrained in an area that allows adequate space for operating the wire saw, adequate help is available [68].

Cesarean Section

Caesarean section (CS) is a common surgical procedure performed in cattle all over the world, with many different techniques [31]. Indications to perform a CS are: immaturity of the heifer, fracture of the pelvis, and tumours of the vagina, cervix or uterus [30], incomplete dilation of the birth canal, irreducible uterine torsion [69], rupture of the uterine wall before calving, relative foetal oversize and deformities of the calf [70; 71]. Risk factors for CS that were identified in dairy cows are: a single male calf, a long gestation period and young age at first calving [44].

The choice of the surgical approach mainly depends on the experience of the veterinarian. However, sometimes other factors such as the physical condition of the patient and her calf and the facilities available may determine which surgical approach to be used. The very first CSs were emergency operations and took place on the standing cow [72]. Since 30 years, the standing flank procedure is favored, in case, no overwhelming uterine contamination is present. The advantages of the flank procedure are the fact that sedation is only seldom necessary and that the cow is tractable. The flank procedure can be performed at the left or the right side [73].

In general, the left flank procedure is preferred, because right side surgery implies a greater risk of protrusion of the intestines during the operation and is contrary for right handed people. In case of an extremely large fetus located in the right uterine horn or an irreducible clockwise uterine torsion some recommend the right side [68].

In case of an emphysematous calf, heavily contaminated uterine fluids, or a recumbent cow, preference should be given to perform the operation on an animal in lateral recumbency. In this position there are different options to open the abdominal cavity: the flank incision (paralumbar incision), incision along the linea alba (median incision), incision between *linea alba* and mammary vein (paramedian incision), incision parallel with the groin pleat (incision of Merkt) and the ventro-lateral incision [74].

Prevention And Control Of Dystocia

Occasional calving problems are unavoidable, the dairy producer cannot totally abolish dystocia from his or her herd, but they can help reduce its occurrence by implementing appropriate management of their heifers and cows during gestation and after parturition. Reducing death loss and other calving-related problems starts with close observation of calving females. Ideally, Females should be checked at least every 3 hours during calving [12; 75].

Management of Breeding Heifers and Cows

Heifers should have reached at least 60 – 65% of their mature body weight at breeding, should be calving at 24 months of age, and should have attained 90% of the mature body weight. Cows and heifers

should be neither too fat nor too thin at calving to manage the body condition at calving between values 3.0 and 3.5 for dairy cows. Feeding of balanced diet during pregnancy is also crucial. Imbalances in minerals, particularly calcium, magnesium, potassium, iodine and selenium, can occur with home-grown forage-only diets. Provide supplementary minerals and vitamins during the last two months of pregnancy. Moving pregnant animals to the calving unit before calving begins reduces stress at calving, which can be a particular problem in heifers [76].

Selection of Easy Calving Sire

There is as much variation between individual sires within and/or between breeds for calving difficulty and gestation length. When choosing an AI sire, comparing the economic breeding index (EBI) is as important as the breed you choose. With stock bulls, without such genetic information, there can be a greater risk of unknown calving dates, calving problems, big calves and calf losses [76].

Since calving difficulty is such an important economic problem, one way to address the problem is through genetic selection. The heritability of birth weight is nearly 48 percent determined by dam and 52 percent by bull. Therefore, by using selection of bulls for their low birth weight, shorter gestation length and calving ease EPDs, it would be possible to alleviate calving problems within a herd. Calving ease EPDs have an advantage in that this measurement of performance is not affected by management and nutritional factors that may influence actual birth weight. While selection of bulls for easy calving, one should also focus on the shape of the shoulder of the bull and animals with a wider shoulder should be avoided [77; 78].

Table 2. Influence of breed of sire on the frequency of dystocia in cattle.

Breed of sire	Total number of calvings	% Easy calvings	% Difficult calvings
Hereford	1056	4.3	2.9
Limousin	1236	4.9	2.4
Charolais	896	5.6	3.3
Simmental	729	8.8	6.2

Source: [79]

Induction of Parturition

Induction of parturition can be a very useful tool for managing calving. Induction of parturition may be indicated for the treatment of uterine hydrops, cardiac failure, or other health-related matters in which salvage of the fetus or the life of the cow are being considered. Parturition induction as a calving management tool is ideally suited to producers of purebred cattle who employ artificial insemination with known breeding dates. The procedure facilitates close observation of calving for detection and correction of dystocia and could reduce perinatal calf deaths [80].

Corticosteroids

Parturition can be induced quite reliably from about day 255 of pregnancy onwards by a single injection of a synthetic glucocorticoid such as dexamethasone, betamethasone or flumethasone. It is assumed that such therapy simulates the effect of the fetal adrenal cortex. A study was carried out on the use of dexamethasone to induce parturition in dairy cows in the UK. Dexamethasone treatment reduced gestation length by 10.8 and 4.3 days when given 14 or 5 days respectively before the expected date of calving [81].

Cows induced 5 days early calved sooner after injection (range 22–71 hours) than those induced 14 days early (range 40–190 hours). Induction of calving 14 days early resulted in a significant decrease in calf live weight of 3.2kg at one day of age. However, there was no significant difference in calf live weights of cows induced 5 days early and their controls. In conclusion, parturition can be induced with dexamethasone as early as 14 days prepartum with no adverse effects on calf viability or milk yield. Even though induction of parturition may increase incidence of retained placenta, the effect can be reduced if relaxin is injected along with dexamethasone [82; 83].

Prostaglandins

Prostaglandins, both PGF2α and synthetic analogues, may be used to induce parturition in cows, although treatment before day 270 of gestation is not recommended. Parturition usually occurs between one and eight days after injection but at an average of three days. There are various effects of PGF2α: PGF2α lowers the threshold of the myometrial oxytocin receptors, indirectly increasing myometrial contractions and directly contracting the uterine smooth muscle [84]. Another effect of increasing PGF2α production in cows is induction of CL regression. Therefore, prostaglandins are the main initiating factors of parturition and are essential for initiating smooth muscle contractions [85; 86].

Economic Impacts Of Dystocia

Dystocia will affect the profitability of the farms generating additional costs compared to normal calving. These costs are not only related to the potential loss of the calf but also to veterinary fees,

increased labor of the farmer, health and fertility problems of the cow after dystocia [87]. Dystocia is an undesirable reproductive outcome resulting in increased risk of calf morbidity and mortality [88] and [12]. According to the United States Department of Agriculture, "calves that survive a dystocia are more susceptible to disease and slower to grow, and dams that experience a dystocia might be culled earlier, produce less milk, reduced fertility [89] and [10], and milk production [90] as well as cow survival [91].

Dystocia also contributes to a delay in breeding. Forty five percent of the cows that experienced calving difficulty could be inseminated during a 45 day breeding season compared to 69% percent of the unassisted cows. The pregnancy rates were 69 and 85% for assisted and unassisted cows, respectively [92]. In addition, dystocia is a welfare problem considered as one of the most painful conditions of cattle [93]. Dystocia also causes an increase the incidence of metabolic diseases in dairy cattle. Dystocia is associated with a twofold increase in the risk of milk fever [94].

Prevalence Of Dystocia In Ethiopia

For several years, Ethiopia is known for its high livestock population, being the first in Africa and tenth in the world [95]. The recent livestock population estimates that the country has about 53.99 million heads of cattle. Out of this total cattle population, the female constitute about 55.48 percent and the remaining percent are male cattle. On the other hand, the results obtained indicated that 98.95 percent of the total cattle in the country are local breeds. The remaining are hybrid and exotic breeds that accounted for about 0.94 percent and 0.11 percent, respectively [96]. Despite the huge number of cattle in the country, productivity is low due to constraints of disease, nutrition, poor management and poor performance of endogenous breed. These constraints result from poor reproductive performance of dairy cattle and lower economic benefit from the sector. Among the major problem that has direct impact on reproductive performance of dairy cows are abortion, dystocia, retained fetal membrane, uterine and vaginal prolapse. This could be classified as postpartum and prepartum [97; 98].

In the study performed on reproductive disorders in Ada'a district (Debre Zeit town), the prevalence of dystocia accounted for 3.3% of the total 37.1% of major reproductive disorders [99]. On the other hand, in the study performed on the major reproductive health problems of indigenous Borena cows, the prevalence of dystocia was recorded as 3.4% [100]. Another study was also conducted on the prevalence of major reproductive health problems of dairy cows and the possible risk factors in and around Kombolcha town; the prevalence of dystocia was recorded as 7.7 % [101].

Conclusion And Recommendations

Dystocia is an undesirable reproductive outcome which has been defined as a difficult birth resulting in prolonged calving or severe assisted extraction of the calf at birth. Dystocia increases the prevalence of stillbirth and calf mortality within 30 days postpartum. In addition, dystocia increases the likelihood of trauma on the dam, uterine disorders, and decreased milk yield, also contributes to a delay in breeding. Incidence of dystocia is generally greater in prime parous cows compared with multi parous cows due to under development of their pelvic area. Dystocia is also influenced by many factors such as: the calves' birth weight, gestation length, season, breed and body condition of the cow of which some of them can be controlled by the owner of the farm through proper selection and management of bulls and cows. Based on the above conclusion the following recommendations are forwarded:-

- The owners of farm should ensure heifers are fed to reach 65% of their mature body weight by 1st service and 85% by the time of calving.
- They should select appropriate breed of sire and appropriate individual within that breed, especially for heifers.
- The owners should use genetic assessment of calf birth weight, gestation length and calving ease when choosing bulls.
- They should manage dry cow nutrition to prevent milk fever, obesity and poor body condition.
- Keep accurate breeding records so cows that go overdue can be identified and induced.
- The owners or the employees on dairy farm should closely observe cows/heifers in parturition every three hour in order to give immediate assistance.
- Feeding the herd later in the day encourages more cows to calve in daylight.
- When assisting cows at calving, the assistant should provide adequate time for a cow or heifer to calve prior to interfering i.e. he /she should not rush in.

Competing interest:

The authors declare that they have no competing interest.

Acknowledgement

We would also like to express our gratitude to Wollega University, College of Medical and health science, School of Veterinary Medicine Staff of School of Veterinary Medicine for inspiration and moral support that enabled to prepare this Seminar paper.

Corresponding Author:
Abriham Kebede
School of Veterinary Medicine, College of Medical and Health Science, Wollega University, P.O. Box, 395, Nekemte, Ethiopia.
E-mail:abrahamkebede2016@gmail.com,
Mobile phone no=+251-917-095-077

References

1. Ghavi Hossein-Zadeh, N., 2013: Effects of main reproductive and health problems on the performance of dairy cows: a review. *Span. J. Agric. Res*. 11(3): 718-735.
2. Mee, J., 2008: A Review of Prevalence and Risk Factors for Dystocia in Dairy Cattle. *Vet. J.* 176: 93–101.
3. Murray, B. 2009: Stillbirths and Calf Survival. The Cattle Site. The Website for Global http://jds.fass.org/cgi/reprint/90/4/1751. Accessed Nov. 10, 2009.
4. Lopez de Maturana, E., Ugarte, E., Komen, J. and Van Arendonk, J., 2007: Consequences of selection for yield traits on calving ease performance. *J. Dairy Sci*. 90(5):2497-505.
5. Youngquist, R. and Threlfall, W., 2007: Current therapy in large animal theriogenology. Saunders Elsevier. St. Louis, Mo., 1061.
6. Sathya, A., Prabhakar, S., Sangha, S. and Ghuman, S., 2007: Vitamin E and selenium supplementation reduces plasma cortisol and oxidative stress in dystocia-affected buffaloes. *Vet. Res. Commun*. 31: 809-818.
7. Yasar, A. and Gazioglu, A., 2006: Relationship between vitamin A and β-carotene levels during the postpartum period and fertility parameters in cows with and without retained placenta. *Bull Vet. Inst. Pulawy*, 50:93-96.
8. Bellows, R. and Lammoglia, M., 2000: Effects of dystocia on cold tolerance and serum concentrations of glucose and cortisol in neonatal beef calves. *Theriogenology,* 53: 803-81.
9. Berry, D., Lee, J., Macdonald, K. and Roche, J., 2007: Body condition score and body weight effects on dystocia and stillbirths and consequent effects on post calving performance. *J. Dairy Sci.* 90: 4201–4211.
10. Tenhagen, B., Helmbold, A. and Heuwieser, W., 2007: Effect of various degrees of dystocia in dairy cattle on calf viability, milk production, fertility and culling. *J. Vet. Med.* 54:98–102.
11. Wittum, T., Salman, M., King, M., Mortimer, R., Odde, K. and Morris, D., 1994: Individual animal and maternal risk factors for morbidity and mortality of neonatal beef calves in Colorado, USA. *Prev. Vet. Med*. 19:1–13.
12. Lombard, J., Garry, F., Tomlinson, S. and Garber, L., 2007: Impacts of dystocia on health and survival of dairy calves. *J. Dairy Sci.* 90:1751–1760.
13. Newby, N., Pearl, D., LeBlanc, S., Leslie, K., Von Keyserlingk, A. and Duffield, T., 2010: Impact of dystocic calvings and retained placenta in dairy cattle on dry matter intake, milk production and serum acute phase proteins. Proc. 26th World Buiatrics Congress, Santiago, Chile, Pp: 323.
14. Bonneville-Hebert, A., Bouchard, E., Du Tremblay, D. and Lefebvre, R., 2011: Effect of reproductive disorders and parity on repeat breeder status and culling of dairy cows in Quebec. Can. *J. Vet. Res.* 75:147-151.
15. Hossein-Zadeh, N. and Ardalan, M., 2011: Cow-specific risk factors for retained placenta, metritis and clinical mastitis in Holstein cows: *Vet. Res. Commun*. 35:345-453.
16. Sewalem, A., Miglior, F., Kistemaker, G., Sullivan, P. and Van Doormaal, B., 2008: Relationship between reproduction traits and functional longevity in Canadian dairy cattle. *J. Dairy Sci*. 91:1660-1668.
17. Mee, J., 2004: Managing the dairy cow at calving time. *Vet. Clin. of North America Food Anim. Pract.* 20:521-546.
18. Cady, R., 2004: Dystocia-difficult calving, what it costs and how to avoid it. University of New Hampshire.
19. Deutscher, G., Colburn, D. and Davis, R., 1999: Climate affects birth weights and calving difficulty. *Nebraska Beef Cattle Report*. Pp: 71.
20. Dargatz, D., Dewell, G. and Mortimer, R., 2004: Calving and calving management of beef cows and heifers on cow-calf operations in the United States. *Theriogenology,* 61: 997–1007.
21. Tadesse, B., 2002: Reproductive performances of zebu breed in the central highlands of Ethiopia. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
22. Meyer, C., Berger, P., Koehler, K., Thompson, J. and Sattler, C., 2001: Phenotypic trends in incidence of stillbirths for Holsteins in the United States. *J. Dairy Sci.* 84: 515–523.
23. Steinbock, L., Nasholm, A., Berglund, B., Johansson, K. and Philipsson, J., 2003: Genetic effects on stillbirth and calving difficulty in Swedish Holsteins at first and second calving. *J. Dairy Sci.* 86: 2228–2235.
24. Lombard, J., Garry, F., Tomlinson, S. and Garber, L., 2006: Impacts of dystocia on health and survival of dairy calves. *J. Dairy Sci. 90* (4):1751-1760.

25. Wiggans, G., Cole, J. and Thornton, L., 2008: Multi parity evaluation of calving ease and stillbirth with separate genetic effects by parity. *J. Dairy Sci*. 91(8):3173-3178.
26. Tiezzi, F., Maltecca, C., Penasa, M., Cecchinato, A., Chang, Y. and Bittante, G., 2011: Genetic analysis of fertility in the Italian Brown Swiss population using different models and trait definitions. *J. Dairy Sci*. 94 (12): 6162-6172.
27. Radostis, O., Leslie K. and Fetrow J., 1994: Herd health. Food Animal Production Medicine. 2nd Edition. London, Saunders Company, Pp: 631.
28. Hafez, B. and Hafez, E., 2000: Reproduction in Farm Animals. 7th ed. USA: Lippincott Williams and Wilkins, Pp: 275.
29. Ball, P. and Peters, A., 2004: Reproduction in cattle. Blackwell Pub. Oxford, UK; Ames and Iowa. Pp: 242.
30. Newman, K., Anderson, D., 2005: Cesarean section in cows. *Vet. Clin. North Am. Food Anim. Pract.* 21(1):73-100.
31. Kolkman, I., De Vliegher, S., Hoflack, G. and Van Aert, M., 2007: Protocol of the Caesarean section as performed in daily bovine practice in Belgium. Reprod. Domest. Anim. 42(6):583-9.
32. Newman, K., 2008: Bovine cesarean section in the field. *Vet. Clin. North. Am. Food Anim. Pract*. 24(2):273-393.
33. Elits, B., 2007: Basic Bovine Obstetrics Laboratory Colorado: 'Alveoros' Lab., Pp: 309-323.
34. Lamb, G., 2012: The Nemesis of a Beef Cow-Calf Operation: The First-Calf Cow. Minnesota.
35. Roberts, S., 2004: Veterinary Obstetrics and genital diseases.2nded. Satish Kumar Jain for CBS publishers and distributors pvt. Ltd., Pp: 237-274.
36. Jackson, P., 2004: Handbook of Veterinary Obstetrics. W B Saunders, Pp: 261.
37. Noakes, D., Parkinson, T. and England, G., 2009: Veterinary Reproduction and obstetrics. 9th ed. London: Saunders Elsevier. Pp: 205-217.
38. Bendixen, P., Vilson, B., Ekesbo, I. and Astrand, D., 1986: Disease frequencies in Swedish dairy cows. I. Dystocia. *Prev. Vet. Med*. 4:307-316.
39. Gevrekci, Y., Chang, Y., Kizilkaya, K., Gianiola, D., Weigel, K. and Akbas, Y., 2006: Bayesian inference for calving ease and stillbirth in Holsteins using a bivariate threshold sire–maternal grandsire model in Abstracts Book of the 8th World Congress on Genetics Applied to Livestock Production, Belo Horizonte, MG, Brazil, Abstract. Pp: 1–26.
40. Arnott, G., Roberts, D., Turner, S., Lawrence, A. and Rutherford, K., 2014: The Importance of the gestation period for welfare of calves: maternal stressors and difficult births. *American Society of Animal Science,* 90: 5021-5034.
41. Colburn, D., Deutscher, G., Nielsen, M. and Adams, D., 1997: Effects of sire, dam traits, calf traits, and environment on dystocia and subsequent reproduction of two-year-old heifers. *J. Anim. Sci*. 75(6):1452-60.
42. Noakes, D., Parkinson, T. and England, G., 2001: Arthur's Veterinary Reproduction and Obstetrics. Saunders. Pp: 864.
43. Zollinger, B. and Hansen, D., 2003: Calving school handbook. *Anim. Scien. Publication*, 110:13-22.
44. Barkema, H., Schukken, H., Guard, L., Brand, A. and Van der Weyden, G., 1992: Caesarean section in dairy cattle: a study of risk factors. *Theriogenology,* 37: 489–506.
45. Zaborski, D., Grzesiak, W., Szatkowska, I. and Dybus, A., 2009: Factors affecting dystocia in cattle. *Reprod Domest Anim*. 44(3):540-51.
46. Johanson, J. and Berger, P., 2003: Birth weight as a predictor of calving ease and per natal mortality in Holstein cattle. *J. Dairy Sci*. 86:3745-3755.
47. Mee, J., Berry, D. and Cromie, A., 2008: Prevalence of, and risk factors associated with, perinatal mortality in pasture-based Holstein–Friesian cows. *Anim. Prod. Sci.* 2: 613–620.
48. Adamec, V., Cassell, B., Smith, E. and Pearson, R., 2006: Effects of inbreeding in the cow on dystocia and stillbirths in US Holsteins. *J. Dairy Sci.* 89: 307–314.
49. Berger, P., Cubas, A., Koehler, K. and Healey, H., 1992: *J. Anim. Sci.* 70: 1775.
50. Wang, Y., Miller, S., Wilton, J., Sullivan, P. and Banks, L., 2000: The relationship between birth weight and calving ease in a beef herd. Ontario Beef Research update, 14-17.
51. Greiner, S., 2004: Managing Calving Difficulty. Livestock Update, March http://sites.ext.vt.edu/newsletter-archive/livestock/aps-04_03/aps-319.html.
52. Carnier, P., Albera, A., Dal Zotto, R., Groen, A., Bona, M. and Bittante, G., 2000: Genetic parameters for direct and maternal calving ability over parities in Piedmontese cattle. *J. Animal Sci.* 78: 2532-2539.
53. Meijering, A., 1984: Dystocia and Stillbirth in Cattle. A review of causes, relations and implications. *Livest. Prod. Sci*. 11:143-177.
54. Holland, M., Odde, K., 1992: Factors affecting calf birth weight: A review. *Theriogenology,* 38(5):769-798.
55. Hanie, E., 2006: Obstetrical Procedures in Large Animal Clinical Procedures for Veterinary

Technicians. Elsevier, Mosby, Missouri, Pp: 413-431.
56. Eaglen, S. and Bijma, P., 2009: Genetic parameters of direct and maternal effects for calving ease in Dutch Holstein–Friesian cattle. *J. Dairy Sci.* 92:229–2237.
57. Thompson, J., Freeman, A. and Berger, P., 1981: Age of dam and maternal effects for dystocia in Holsteins. *J. Dairy Sci.* 64:1603–1609.
58. Sundberg, T., Rydhmer, L., Fikse, W., Berglund, B. and Strandberg, E., 2010: Genotype by environment interaction of Swedish dairy cows in organic and conventional production systems. Acta Agric. Scand. Sect. A, 60:65-73.
59. Olmos, G., Boyle, L., Hanlon, A., Patton, J., Murphy, J. and Mee, J., 2009: Hoof disorders, locomotion ability and lying times of cubicle-housed compared to pasture-based dairy cows. *Liv. Sci.* 125:199-207.
60. Ostojic-Andric, D., Hristov, S., Novakovic, Z., Pantelic, V., Petrovic, M., Zlatanovic, Z. and Niksic, D., 2011: Dairy cow welfare quality in loose vs tie housing systems. *Biotech. In Anim. Husb.* 27:975-984.
61. Hickson, R., Morris, S., Kenyon, P. and Lopez-Villalobos, N., 2006: Dystocia in beef heifers: A review of genetic and nutritional influences. *New Zealand Vet. Journal.* 54:256-264.
62. Prior, R. and Laster, D., 1979: Development of the bovine fetus. *J. Animal Sci.* 48:1546-1453.
63. Patricia L. Houghton and Larry R. Corah, December 1989: Calving difficulty in Beef Cattle, Kansas State University.
64. Anderson, L. and Bullock, K., 2000: Pelvic measurements and calving difficulty. Cooperative Extension Service Bulletin, University of Kentucky, KY, USA, Pp: 1–3.
65. Drost and Momont, 2005: Management of Calving on Large Farms. 2nd Florida Dairy Road Show, Pp: 42-52.
66. Benesch, F. and Wright, J., 2001: Veterinary Obstetrics. 1st ed. Liverpool: Bailliere, Tindall and Cox CBS publishers and distributors, Pp: 138-140.
67. Gavit, S., 2014: Treatment of dystocia. Sanjaygavit in Cattle and Buffaloes. 1st ed. Walling ford: AB International, Pp: 202.
68. Schultz, L., Tyler, J., Moll, H. and Constantinescu GM., 2008: Surgical approaches for cesarean section in cattle. *Canadian Veterinary Journal* 49:565-568.
69. Schonfelder, A. and Sobiraj, A., 2006: Caesarean section and ovariohysterectomy after severe uterine torsion in four cows. *Vet. Surg.* 35: 206–210.
70. Dawson, J. and Murray, R., 1992: Caesarean sections in cattle attended by a practice in Cheshire. *Vet. Rec.* 131: 525–527.
71. De Kruif, A., 2003: Reproduction and Obstetrics of the Animal. Faculty of Veterinary Medicine, University of Ghent, Ghent, Belgium. Pp: 75–84.
72. Mijten, P., 1994: Complicaties van de keizersnede bij the rund. Proefschrift Doctor in de Diergeneeskundige Wetenschappen. Faculteit Diergeneeskunde, Gent 5-220.
73. Andrews, A., Boyd, H., Blowey, R. and Eddy R., 2004: Bovine Medicine Diseases and Husbandry of Cattle. Oxford: Blackwell Science. Pp: 1115-1118.
74. Frazer, G. and Perkins, N., 1995: Cesarean Section. *Vet. Clin. North Am. Food Anim. Pract.* 11: 19-35.
75. Anonymous, K., 2009: Effects of farming systems on dairy cow welfare and disease. Annex to the *EFSA* (European food safety authority) *Journal.* 1143: 1–284.
76. Ingrid, L., John, F., Mee, W. Bernadette, E., Simon, J. and More, K., 2011: Calf health from birth to weaning. I. General aspects of disease prevention. *Irish. Vet. Journal.* 64:10. http://www.irishvetjournal.org/content/64/1/10.
77. Manhattan, K., 1989: Kansas State University Cooperative Extension Service. *Calving Difficulty in Beef Cattle.*
78. Cumming, B., 1999: Bull soundness-structural. NSW, Department of primary industries, NSW, Australia.http://www.dpi.nsw.gov.au/agriculture/livestock/beef/breeding/bulls/structural-soundness.
79. McDermott, J., Allen, O., Martin, S. and Alves, D., 1992: *Can. J. Vet. Res.*, 56:47.
80. Bellows, A., Short, R. and Staigmiller, R., 1994: Exercise and induced-parturition effects on dystocia and re breeding in beef cattle. *J. Anim Sci*. 72(7):1667-1674.
81. Peters, A. and Poole, D., 1992: Veterinary Record, 131: 576.
82. Curtis, C., Erb, H., Sniffen, C., Smith, R., Powers, P. and Smith, M., 1983: Association of parturient hypocalcemia with eight periparturient disorders in Holsteincows. *J. Am. Vet. Med. Assoc.*183: 559 – 561.
83. Melendez, P., Donovan, A., Risco, C. and Jesse, P., 2004: Plasma mineral and energy metabolite concentrations in dairy cows fed an anionic prepartum diet that did or did not have retained fetal membranes after parturition. Am. *J. Vet. Res.* 65: 1071 – 1076.
84. Taverne, M. and Noakes, D., 2009: Parturition and the care of parturient animals, including the newborn. In: Veterinary Reproduction and

Obstetrics, 9th edn. Noakes DE, Parkinson TJ, Engalnd GCW, eds. London: Saunders Elsevier, Pp: 154-205.
85. Fuchs, A., Fields, M., Freidman, S., Shemesh, M. and Ivell, R., 1995: Oxytocin and the timing of parturition. Influence of oxytocin receptor gene expression, oxytocin secretion, and oxytocin-induced prostaglandin F2 alpha and E2 release. *Adv. Exp. Med. Biol.* 395: 405-420.
86. Van Engelen, E., Taverne, M., Everts, M., Van der Weijden, G., Doornenbal, A. and Breeveld-Dwarkasing, V., 2007: EMG activity of the muscular and stromal layer of the cervix in relation to EMG activity of the myometrium and cervical dilatation in PGF2α induced parturition in the cow. *Theriogenology,* 67: 1158-67.
87. Alberro, M., 1983: Comparative performances of F1 Friesian cross with Zebu heifers in Ethiopia. *Anim. Prod.* 37: 247 - 252.
88. Bicalho, R., Galvao, K., Cheong, S., Gilbert, R., Warnick, L. and Guard, C., 2007: Effect of stillbirths on dam survival and reproduction performance in Holstein dairy cows. *J. Dairy Sci.* 90: 2797–2803.
89. Fourichon, C., Seegers, H. and Mahler, X., 2000: Effect of disease on reproduction in the dairy cow: a meta-analysis. *Theriogenology,* 53: 1729–1759.
90. McGuirk, B., Forsyth, R. and Dobson, H., 2007: Economic cost of difficult calvings in the United Kingdom dairy herd. *Vet. Record.* 161: 685–687.
91. McClintock, S., 2004: A Genetic Evaluation of Dystocia in Australian Holstein–Friesian Cattle. Ph.D., University of Melbourne.
92. Anderson, P., 1992: Minimizing calving difficulty in beef cattle. Proceedings Minnesota Beef Cattle Improvement Association Annual Beef Cattle Conference, Minnesota, USA. 21: 1-15. http://www.extension.umn.edu/Beef/components/publications/bcm07.pdf.
93. Huxley, J. and Whay, H., 2006: Current attitudes of cattle practitioners to pain and the use of analgesics in cattle: *Vet. Record*. 159: 662–668.
94. Tyler, H. and Ensminger, M., 2006: Dairy Cattle Science. 4th ed. Pp: 371-381.
95. Gebrecherkos and Berihun, A., 2012: Prevalence of bovine fascilosis in municipal Abbatoir of Adigrat, Tigray, Ethiopia. Mekelle University College of Veterinary Medicine, Mekelle, Ethiopia.
96. Central Statistics Agency of Ethiopia (CSA), 2012: total cattle population, http://www.csa.gov.et.
97. Shiferaw, Y., Tenhagen, B., Bekana, M. and Kassa, T., 2005: Reproductive disorders of cross breed dairy cows in the central highlands of Ethiopia and their effect or reproductive performance, Tropical Animal Health and Production, 37: 427-441.
98. Lobago, F., Bekana, M., Gustafson, H. and Kindahl, H., 2006: Reproductive performance of dairy cow in smallholder production system in sellable, Central Ethiopia. *Tropical Anim. Health and Prod.,* 38: 333-342.
99. Esheti, G. and Moges, N., 2014: Major Reproductive Health Disorders in Cross Breed Dairy Cows in Ada'a District, East Shoa, Ethiopia. *Global Veterinaria,* 13(4): 444-449.
100. Benti, A. and Zewdie, W., 2014: Major reproductive health problems of indigenous Borena cows in Ethiopia. *J. Adv. Vet. Anim. Res.* 1(4): 182-188.
101. Dawit, T. and Ahmed, S., 2013: Reproductive health problems of cows under different management systems in kombolcha, Northeast Ethiopia. *Advances in Biological Research,* 7: 104-108.

1/27/2017