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Review on the Peridisposing Factors, Causes and Economic Impact of Dystocia in Dairy Cows

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Abstract: Reproductive health problems are one of the most important problems that affect the reproduction and productivity of dairy cow. Dystocia is one of the reproductive health problems that cause considerable economic loss to the dairy industry. It is defined as prolonged or difficult parturition and it is a condition in which the first or especially the second stage of parturition is markedly prolonged for more than six hours and the cow required assistance. There are different predisposing factors which influence the likelihood, like; infection, heredity, nutrition, calf sex, exercise, cow age, gestation length. Also, there are different causes that are associated with dystocia in dairy cows, which can result from both maternal and fetal causes. However, it can result from other causes that interfere with the expulsive forces needed to expel the calf. These includes: lack of uterine contraction (weak labour), incomplete dilation of the cervix and vagina, due to stenosis and uterine torsion. Improper cervical dilation appears to be more frequent maternal cause of dystocia in cattle and commonly occurs in heifers than cows. Generally, it is important to know the predisposing factors and causes of difficulty in birth as well as economic loss. It is an undesirable reproductive event resulting in increased risk of calf morbidity, mortality, reduced fertility and milk production, as well as cow survival and consequently reduces farm profitability on dairy farms. Therefore, to avoid its adverse effect every dairy farm should implement a dystocia monitoring program and employ management practices that limits the occurrence and impact of dystocia.

Key words: Dairy cow · Dystocia · Fetal cause · Maternal cause · Predisposing factor

INTRODUCTION

Ethiopia is well-known, to have huge number of livestock populations [1]. However, the huge number of livestock resource and their contribution for the economic aspect of the country is still lowest. Thus, the low economic returns from these resources are associated with several factors, such as diseases, poor management and low genetic potential of indigenous breeds. Due to these factors, the reproductive health problem cause considerable economic loss to the dairy industry such as reduced uterine involution, prolonged inter conception rate, calving interval, negative effect on fertility, drop in milk production and early depreciation of potentially useful cows [2].

Therefore, reproductive disorders are one of the most important problems that affect the reproduction and productivity of dairy cows [3]. In the absence of regular breeding and calving at the appropriate time, enterprise will not be profitable. The main goal of the dairy reproduction is to obtain a healthy calf from each dairy cow every year. through improving the reproductive efficiency of the cow. Successful reproduction encompasses the ability to mate, the capacity to conceive, nourish the embryo and deliver the viable young ones at the end of a normal gestation period [4].

However, dystocia is one of the reproductive problem may be defined as the inability of the cow to deliver its calf through its own force [5]. Moreover, it may have negative effects on levels of milk yield and reproductive performance; due to the cause of stillbirth, cow death, retained placenta, uterine infections, or increased involuntary culling. There are a variety of predisposing factors for dystocia such as breed, parity, condition of cow at calving, sex, birth weight of calf and season of calving [6].

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Foeto-pelvic incompatibility is the major cause of difficulty at calving. However, dystocia can result from other causes that interfere with the expulsive forces needed to expel the calf. These includes: lack of uterine contractions (Weak labour), incomplete dilation of the cervix and vagina, due to stenosis (Narrowing and stiffening of the tissue) and uterine torsion [7]. It is much more common in primiparous than in multiparous cows [2] and results from the smaller stature and the slow maturation of pelvic dimensions of young heifers [8].

It has been a direct negative impact on calves (e.g., prolonged hypoxia, significant acidosis, vigor, increased stillborn calves, etc.) as well as on cows (e.g., trauma, paresis, metritis, endometritis, etc.). Stillbirth is defined as a calf born dead or dead within 24 hours after birth [9]. In heifers, the primary types of dystocia are oversized calves, abnormal foetal position and failure of the vulva to dilate. In older cows, the primary types of dystocia are abnormal foetal position, oversized calves, multiple fetuse, uterine inertia, uterine torsion and failure of the cervix to dilate. The rate of dystocia can be up to three times greater in heifers as compared with the older cows [10]. The incidence of dystocia appears to be higher in the larger breeds, such as the Holstein Friesian, Brown Swiss and Hereford [11].

Dystocia is an economically important and major problem in the dairy industry [12]. Several studies have revealed that dystocia adversely affected the survival, health and production of calves and dams [13]. It is associated with approximately 50% of calf mortality at birth [14]. But can also have a profound influence on cow performance [15]. Due to various predisposing factors and cause of calf born with assistance, dystocia is an undesirable reproductive event resulting in increased risk of calf morbidity and mortality [9, 16], reduced fertility [17] and milk production [12] as well as cow survival [16].

Therefore, the objectives of this seminar paper are to review the major predisposing factors and causes of dystocia and to assess the economic significance of dystocia and to highlight the possible management approaches.

Predisposing Factors of Dystocia in Dairy Cows

Calf Sex and Gestation Length: Male calves have more difficult births than female calves. This result indicates directly from their bigger size and heaver birth weight. In addition, gestations with male calves are longer, which also influence the risk of dystocia [18]. An increased incidence of dystocia resulting from longer gestation period was observed in beef cows. In Hereford as well as Angus breeds with no significant effect of gestation length on dystocia was reported[19].

Cow Body Condition during Dry Period and at Calving: A body condition score must be optimal to ensure an easy calving. Over conditioned cows have a higher risk of dystocia and metabolic disorders during early lactation; whereas too thin heifers do not gains the appropriate body size at calving at the age of 24 months. The optimal level of body condition is considered to be three to four points in body condition score. The lower score (BCS<3) indicates that the cow has been deficiency of energy [20].

Cow Age at Calving: Usually younger cows have more difficult birth calves, irrespective the number of parturitions. Cow age at calving is directly related to its size which in turn influences the calf size. Therefore, smaller cows tend to give birth to smaller calves, thus reducing the risk of dystocia [4].

Season: The rate of dystocia is higher during the winter than during the summer, however, the exact definition of these seasons is different. An easier access to a pasture in summer, more physical exercises and longer days are suggested factors of seasonal differences. The rate of dystocia in Holsteins Friesian is 15.0% higher in winter than in spring and summer [21]. Cold weather (Air and wind chill temperatures of approximately -5 and -10°C, respectively) during the last trimester has been associated with increased dry matter intake (DMI), thyroid hormone concentration, blood flow to the uterus, gestation length and reduced plasma estradiol concentrations leading to increased birth weight and dystocia [22].

Nutrition: Improper feed nutrition for the growth heifers is the most important factor in retarding body and pelvic growth. High nutritional feeding levels may favor dystocia especially in heifers, by excessive deposition of fat in the pelvis [23]. However, too intensive administration of vitamin D during a dry period may be the reason for more dystocia in a similar way as too low administration of Calcium (Ca). It is also important to administer the adequate amounts of vitamins A, D and E. Moreover, the type of diet may directly affect the level of dystocia [4].

Infection: Any types of infection or disease affects the pregnant uterus and its contents may cause abortion, uterine inertia, fetal death and occasionally septic metrits

of pregnancy. In severe cause of infection of the uterus, the uterine wall may lose its ability to contract a condition resulting in incomplete dilation of the cervix and uterine inertia [11].

Exercise and Genetics: Pregnant animals which are not exercised and are kept in close confinement are more prone to difficulties, such as torsion of the uterus and inertia than those kept under natural conditions, as on the pasture field. Exercise increases body tone, strength and resistance and results in stronger labor contractions, less fatigue, shorter duration of parturition, less uterine inertia and prompt recovery [11]. Increased muscle tone in heifers and cows can lead to easier calving. Forced exercise consisting on walking one mile per day for four weeks prior to calving has been shown to improve the calving ease of closely confined dairy heifers. These heifers showed improved calving ease score, reduced placenta retention time and less days open following calving. Many beef heifers are grown and developed in semi-confinement dry lot conditions similar to dairy operations. Where this management system for heifers could benefit from increased exercise prior to calving [24].

Also influences the incidence of feto-maternal disproportion in cow. It is the existence of differences in pelvic size among different breeds that seemed to be due to differences in cow body weight, although a tendency for larger pelvic openings in larger cows are found. The pelvic width is influenced by breed has determined dystocia rate to a large extent. Hereford cows had the smallest pelvic height, width and area, whereas Braunvieh had the largest pelvic width and Charolaise the largest pelvic height and area [6].

Causes of Dystociain Dairy Cows: There are different causes and risk factors associated with dystocia in dairy cow which can result from both maternal and fetal causes [25].

Maternal Causes

Feto-Maternal Disproportion: Feto-maternal disproportion 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 or weight or pelvic dimensions of the dam, that may have several factors in its origin [26, [28]. The dimensions of the bony pelvis are too small to allow passage of the fetus. This is most commonly caused by maternal immaturity and often occurs as a result of heifers being served at too young age. A small pelvis is a component of dystocia due to feto-pelvic disproportion and is exacerbated in cases where the fetus is larger than normal [5].

Incompletecervical Dilatation: The failure of the cervix to completely dilate is a relatively common cause of dystocia in the dairy cow. It may occur both in the heifer and multiparous cows [29]. Enzymatic loosening of fibrous strands by elevated collagenase and the physical forces of the uterine contractions and fetal mass are considered to be responsible to effect sufficient dilatation of the cervix during parturition in the cow [30]. An increase in inflammatory cytokines during parturition is also having known effect on cervical dilation [31]. Cervical non-dilation can occur because of the failure of any of the mechanisms responsible for dilation described above or spasm of the cervical muscles or other poorly understood mechanisms and results in dystocia [25].

Uterine Inertia: The condition where the uterine expulsive forces fail to deliver a fetus is known as uterine inertia. Uterine inertia is classified conventionally into primary and secondary uterine inertia. Primary uterine inertia is failure of uterine muscle to contract normally at parturition which may occur due to failure of the muscle to respond to hormonal stimuli and disease of muscle or failure to release hormones such as estrogen and possibly oxytocin that initiate normal uterine muscles contraction [11].The most common cause of primary uterine inertia in dairy cows is considered to be hypocalcaemia, with the animal showing signs of milk fever as calving is about to begin. When the uterine musculature becomes exhausted subsequent to failure of delivery of a mal disposed or oversized fetus or due to obstruction in the birth canal, then the condition is known as secondary uterine inertia. The contractions of the uterus then stop or become weak and transient. The animal shows no progress in parturition after the second stage of labor. It is produced by lack of tone or failure of the uterine muscles to contract [25].

Uterine Torsion: Torsion of uterus usually occurs in a pregnant uterine horn and is defined as the twisting of the uterus on its longitudinal axis. The exact etiology of uterine torsion is poorly understood. It appears that

instability of the uterus during a single horn pregnancy and inordinate fetal or dam movements probably are the basic reasons for rotation of the uterus on its own axis [32].

Hernia of the Gravid Uterus: Occasionally in cows, hernia of the gravid uterus occurs through a rupture of the abdominal floor. The accident is one of advanced pregnancy, occurring from the seventh months onwards in dairy cows. It is probable that the majority of cases results from a severe blow on the abdominal wall though it may occur without traumatic influence; the abdominal musculature becoming in some way so weakened that it is unable to support the gravid uterus. The site of the original rupture is the ventral aspect of the abdomen, at the right side in the case of cows. Ventral displacement of the uterus is an uncommon cause of dystocia in cows. It is seen in animals with a ventral hernia or rupture of the prepubic tendon where the pregnant uterus passes downward into the point of the hernia [29].

Fetal Causes: Generally, the fetal origins of dystocia in cow can be divided into those caused by either excessive fetal size relative to the maternal pelvis (Feto-pelvic disproportion), or by abnormalities of the fetus (Fetal monsters, fetal diseases and fetal mal-disposition). Thus, fetal dystocia is reviewed according to fetal oversize and fetal abnormalities [25].

Fetal Oversize: It has been well documented by numerous researchers that the weight of the fetus is usually the major factor causing calving problems. This indicated that birth weight is the trait most highly correlated with dystocia, followed by sex of calf, pelvic area and gestation length and cow weight. Genetics and breed of sire play the most important role in determining calf birth weight; however, the maternal genetic influence should not be overlooked. Therefore, by putting selection pressure on bulls for birth weight and calving ease, it would be possible to alleviate many existing calving problems [4].

Fetal Mal –Dispositions: Presentation is a relationship between longitudinal axis of dam with the longitudinal axis of fetus and parts present towards birth canal. The presentations are either anterior or posterior; the portion of the fetus that is approaching or entering the pelvic cavity or birth canal [11]. Position is the relationship between vertebral column of fetus with the four quadrants of pelvic inlet of the dam and it can be dorsal, ventral and lateral [33]. Posture is relationship between movable appendages of fetus with its own body. It signifies the relation of the extremities or the head, neck and limbs [34].

Mal-presented calves have two-times higher risk of dystocia and five- time higher risk of stillbirth [32]. Transverse presentation is also a mal-presentation. An extremely unusual mal-presentation in which the fetal body is found lying vertically across the pelvic inlet is the vertical presentation. In normal delivery the calf is in dorsal position with its spinal column beneath that of the cow. Abnormalities of position include ventral position, in which the calf is upside down, lateral position, when the calf is lying on its side. These abnormalities of position may also be seen when the fetus is in posterior presentation. Abnormality of posture may involve the head, forelimbs, hind limbs, or a combination of these [5].

Twinning: Twin gestation in cow often culminates in dystocia. Twin dystocia include both fetuses present simultaneously and become impacted in the maternal pelvis, one fetus only is presented but cannot be born because of defective posture, position or presentation; posture is often most at fault, the lack of extension of limbs or head being due to insufficient uterine space, uterine inertia, defective uterine contractions are caused, either by the excessive fetal load, or by premature birth. When inertia is present, birth of the first or second fetus can not proceed, although presentation is normal [33].

Fetal Diseases: Various diseases of the fetus can result in the altered shape of the fetus and dystocia in the cow. Dropsically conditions of fetus resulting in dystocia include hydrocephalus, ascites, hydrothorax and anasarca [25].A prolonged dystocia due to fetal ascites in a crossbred cow which is successfully managed with antibiotics, anti-inflammatory and supportive therapy following manual puncturing of fetal abdominal cavity with guarded knife to relieve dystocia [35]. The exact causes of these conditions are not known, but disorders of fetal circulation or obliteration of fetal lymphatics usually results in anasarca and diminished urinary excretion in ascites. Hydrocephalus is accumulation of excessive fluid in dura matter or ventricles of brain. Hydrocephalus is assumed to arise from disturbances in normal circulation of cerebrospinal fluid resulting from its altered production or absorption [25]

Diagnosis of Dystocia in Dairy Cows: The diagnosis of dystocia is based on the history and physical examination [36]. Information obtained from the owner should include the duration of gestation, the previous breeding history, whether dystocia or any other abnormal condition was present at previous parturitions or the length of time the animal has been in active labor [11]. The cow's physical and general condition should be noted. Body temperature and pulse rate should be noted and the significance of abnormalities considered [29]. Fetal movement should be noticed at the cow's left flank and if this is vigorous, it indicates the placental separation which causes fetal anoxia and hyper motility, signs of placental separation may be seen at the vulva if part of the chorio-allantois with detached cotyledons are visible, a light yellowish vaginal discharge may indicate fetal anoxia or fetal death with associated expulsion of meconium [34].

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 [37]. After lubricated the hand should be inserted into the vagina and assessed the condition of the cervix. If the cervix is closed, the protruded soft external OS of the cervix can be identified but, fully dilated cervix cannot be distinguished because the vaginal walls remain continued with the uterine wall. The size of the pelvis should also be determined whether it is narrow or normal. It also ascertains whether the forelimbs or hind limbs are present in the birth canal [34]. 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. However, examination of the reproductive organs by palpation per rectum is indicated in only few cases of dystocia. The most common indication for rectal palpation is to confirm uterine torsion when stenosis of the cranial vagina is detected during a vaginal examination. Pelvis deformities and exostoses may be more readily detected by palpation per rectum than by vaginal examination [38].

Management of Dystocia in Dairy Cows: Producers need to consider both genetics and management in attempt to reduce dystocia. Management advice would include mating heifers, so that the calves earlier in the season than cows, so that they can be paid extra attention and feeding cows properly through consideration of nutrient requirements and condition scores. In addition, producers should know when and how to give assistance and when a veterinarian should be called [39]. However, a small proportion of cows and a greater proportion of heifers may require assistance. Thus, good supervision is dependent upon monitoring calving, particularly stage two and intervening if and where necessary, while avoiding excessive direct supervision. Regular observations are required to determine the progress of labor and when and how to provide assistance or seek for help from a veterinarian [24].

The use of specific ecobolic drugs such as oxytocin, calcium or glucose therapy may be required in cases where a deficiency is suspected. For the case of uterine torsion, antibiotic and nonsteroidal anti-inflammatory drugs (NSAID) are provided [40]. Prostaglandin F_2 alpha (PGF_2á) and its analogs are recommended to induce uterine contractions which may be useful for expulsion of uterine contents [41] A deficiency of estrogen is considered to be one important cause of failure of cervical dilation hence, injection of estrogens like estradiol valerate 20–30 milligrams intramuscularly can be helpful and however, estrogen should be given with care in a completely closed cervix, because of the dangers of uterine rupture that may follow because of violent contractions. Likewise, injections of oxytocin 20-40 international units (IU), intravenously or intramuscular can be given to promote uterine contraction to effect cervical dilation when it is partially dilated [25]. The principal purpose of obstetrical operations is to deliver a viable fetus and to prevent injury to the dam [29].

Preventive Management of Dystocia in Dairy Cows: Includes ensuring that bulls used for yearling mating are of the same breed, have low birth weight estimated breeding values (EBVs) or are known not have a large mature [42]. Other recommended strategies are keeping heifers growing at all times, especially during the first half of pregnancy and avoiding obesity at calving. Replacement heifers should be well developed and fed adequately to reach 65% of their mature weight at breeding. [32]. Furthermore, since genetic selection could improve calving performance, it is important to include calving traits, such as dystocia, in genetic evaluations [43].

In general, dystocia control measures include avoiding mating that cause big calves, preventing heifer obesity at calving and most importantly, keeping heifers growing at all times, especially during the first half of pregnancy. Under-nutrition at any stage can retard pelvic growth. Under-nutrition during early pregnancy may

increase size and efficiency of the placenta, which disproportionately increases fetal growth, when adequate nutrition is restored [42]. According to the prevalence and effects of dystocia can be reduced in three ways:

Pre breeding management by selecting sires for calving ease and dams for adequate pelvic size (dam selection has never been done in the dairy industry), breed heifers of recommended height and weight and provide optimal nutrition during pregnancy. Calving time: ensure that calving areas are comfortable and as stress free as possible and provide assistance when needed using proper techniques and procedures.

Neonatal assistance to provide maternal and additional care as needed to stimulate respiration maintain body temperature (thermoregulation) and increase blood volume via colostrum [21].

Economic Impacts of Dystocia in Dairy Cows

Direct Losses: Dystocia is the most important factors that affecting calf survival. Because due to the death of calves and cows, losses production in both the cow and calf and delayed reproduction rates [4]. Out of all the pre-weaning deaths, 45.9% can be attributed to dystocia. It may cause prolonged hypoxia and acidosis, which, if not resulting in the death of the full-term fetus, may result in weakness and prolonged recumbency after delivery. This may reduce colostral immunoglobulin intake, resulting in an increased short to medium-term mortality rate in calves. In addition, forces exerted on the fetus during delivery may cause cardiopulmonary malfunction. All these factors will reduce the likelihood survival of the neonate [9].

Poor Survival in the Lactation: Dystocia can lead to the death of the cow in the most severe cases usually occurring within 48 hours. [44]. Even beyond those 48 hours, cows that have experienced dystocia are more likely to die or be culled in early lactation and over the lactating period [45]. Moreover, the fear that the animal might experience difficulty at her next parturition may increase weight to the farmer's decision to cull a dystocia cow [13].

Poor Milk Production: Several studies have been implicated dystocia as a contributing factor to reduced milk yield [12]. Primiparous cows with dystocia produced 85 kg marginally significantly less milk in the first 100 days of lactation than cows with eutocia. Decreased milk yield in the first trimester of lactation in cows with dystocia may be associated with trauma in parturition and increased risk of postpartum complications. Decreased milk yield in cows with dystocia, could result from several factors including hormonal changes and reduced appetite. In the second 100 days of lactation (101 to 200 days), however, milk yields of cows with dystocia were similar to those of cows with eutocia [13].

Feed Intake and Metabolic Dysfunction: Cows that experience dystocia change their feeding behavior beginning three days before calving and standing behavior beginning 12 hrs before calving compared to cows that calve without assistance [46]. Thus, an improved understanding of how dystocia impacts cow behavior will aid in the development of housing practices that accommodate cows at-risk for experiencing difficult calving. During the lactating period, dry matter intake (DMI) was shown to decrease in cows that had experienced dystocia in the months postpartum [47] as compared to cows that calved normally, but this was not seen in the first two days postpartum [46]. This could relate to lower milk production observed in dystocial animals but also to the greater losses in weight and body condition score found in dystocial cows during their subsequent lactation [48]. This may be related to changes in the metabolic function and lower immune competency in these animals [13].

The experience of dystocia in Holstein Friesian dairy cows is also associated with hematological changes at delivery relating to hepatic function. For example, dystocial Holstein heifers had higher cortisol, cholesterol, glucose, high density lipoprotein (HDL), triglycerides, creatinine and vitamin A levels than eutocial animals, which might reflect higher calving stress in these animals [49]. It is possible that such stress but also exhaustion, pain and human intervention during delivery may contribute to reduce or delayed maternal care of the calves in the first hours postpartum [50].

Indirect Losses: In dairy animals, the prolonged parturition resulted in a slightly delayed onset of oestrus post-calving, slightly more services or conception and reduced subsequent conception rate. Bovine dystocia is associated with a higher incidence of retained foetal membranes, uterine disease (endometritis, metritis, pyometra, uterine rupture) and periparturient hypocalcaemia in the cows [28].

Lengthened Labour, Uterine Health and Fertility: The high incidences of dystocia can adversely effects the reproductive performance of Holstein Friesian dairy cows [51]. The first oestrus, first service, service period, days

Table 1: Prevalence of dystocia in dairy cow in Ethiopia.

Area	Prevalence
Adama	6.95%
Alage	3.1%
Awassa	9.7%
Bedelle (South western Ethiopia)	6.6%
Borena Zone	3.4%
DebreZeit (Central Ethiopia)	2.9%
East Shoa	3.3%
East Wollega	6.7%
Holleta	7.5%
Hosanna (Southern Ethiopia)	5.9%
Jimma	3.8%
Kombolcha (Northeast Ethiopia)	7.75 %
Mekelle	11.6%

Source: Nejash and Wahid [32]

open and calving interval were significantly longer in cows that exhibited dystocia compared to normal cows. Furthermore, their results have indicated that dystocia led to increasing the service interval, service period, day open and calving interval. Cows experiencing difficulty at birth are more likely to suffer from postpartum diseases such as metritis, retained placenta and milk fever [52]. This could be explained by the possibility of microbial contamination during assistance combined with a depressed immune status during the peripartum period [53].

Immuno deficiency is probably enhanced in dystocia cows as a consequence of the increased duration of labour and the subsequent higher cortisol levels [49]. An increase in the number of days open, the number of services to conception rate and a delay to first service has been shown after dystocia [17]. This impaired fertility after dystocia is thought to contribute to 30% of the cow related costs of dystocia [32]. Also, the incidence of dystocia resulted in a significant reduction in conception rate, where the conception rate at 90, 120 and 150 days and the entire lactation for cows that exhibited dystocia were reduced by 10.7, 11.5, 12.02 and 12.5% compared to normal cows, respectively [51]. In generally, poorer fertility is one economic impact of dystocia in dairy cow [17].

Status of Dystocia in Ethiopia: Reproductive problems of dairy cow are common in Ethiopia. In the country, dairy cows are maintained under different production systems [32]. The differences in management (production) systems and environmental conditions under which dairy cows are maintained could greatly affect the health of reproductive system. It has been indicated that the reproductive problems result in considerable economic losses to the dairy industry and are the main causes of poor productive performance of small holder dairy farms [54]. The prevalence of dystocia in dairy cow from different area of Ethiopia and most of the reported prevalence of dairy cows ranged from 2.9% to 11.6% [32].

CONCLUSION AND RECOMMONDATIONS

Dystocia is a condition of difficulty in parturition. It has been caused by maternal and fetal causes as well as predisposing factors. It has negative impacts on the dairy farm, the cow and its calf. It is associated with a reduction in milk yield in the subsequent lactation and poorer cow fertility and health, which have negative consequences for farm economics as well as for cow and calf welfare. With respect to the calf born by external force is associated with higher mortality in the immediate post-natal period and it is related with 50% of pre weaned calf losses. However, there has been less attention paid to the effects of a dystocia birth on the surviving calf. Thus, growth, survival, health and welfare of the calf may be adversely affected. Obviously, based on the frequency of occurrence and the impact, dystocia should be an area of great concern for the dairy industry.

Based on the above conclusion the following recommendations are forwarded:

- Every dairy farm owners should implement a dystocia monitoring program and employ management practices that limit the occurrence and impact of dystocia.
- Education of dairy and beef producers and farm owners on the management and in strategies to reduce dystocia and its effect on calves should be a priority.
- Appropriate feeding management and exercise should be accustomed by cattle rearing groups.
- Producers should know when and how to give assistance and when a veterinarian should be called.
- Dairy farm owners should select appropriate size of sire to that of dams at the time of breeding and avoided breeding of heifers at young ages.

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