Journal of Reproduction and Infertility 7 (2): 63-74, 2016
ISSN 2079-2166

DOI: 10.5829/idosi.jri.2016.7.2.10457

Risk Factors and Economic Impact of Dystocia in Dairy Cows: A Systematic Review

[1]*Nejash Abdela and* [2]*Wahid M. Ahmed*

[1]School of Veterinary Medicine, College of Agriculture and Veterinary Medicine,
Jimma University, Jimma, Ethiopia P. O. Box. 307 Jimma, Ethiopia
[2]Department of Animal Reproduction & AI, National Research Centre, Giza, Egypt

Absract: Reproductive health problems are one of the most important problems that affect the production and productivity of dairy cows. Dystocia is also one of the reproductive health problems that cause considerable economic loss to the dairy industry. The main aims of this manuscript were to review risk factors and economic impact of dystocia in dairy cows. Dystocia is also defined as prolonged or difficult parturition and it is a condition in which the first or, especially the second stage of parturition was markedly prolonged for more than 6 hr and the cow required assistance. There are different causes and risk factors associated with dystocia in dairy cattle which can result from both maternal and foetal factors. Breed parity, weight and condition of cow at calving, sex and birth weight of calf, malpresentation, multiple calving can be a risk factors for dystocia. Foeto-pelvic incompatibility is the major reason leading to difficulty at calving. However, dystocia can result from other causes that interfere with the expulsive forces needed to expel the calf. This includes: lack of uterine contractions (weak labour), incomplete dilation of the cervix and vagina due to stenosis and uterine torsion. Dystocia has negative impacts on the farm, the cow and the calf. It is an undesirable reproductive event resulting in increased risk of calf morbidity and mortality, reduced fertility and milk production, as well as cow survival and consequently reduces farm profitability on dairy farms. Moreover, dystocia may have negative effects on reproductive performance, causing stillbirth, cow death, retained placenta, uterine infections, or increased involuntary culling, which have negative consequences for farm economics as well as for cow welfare. Thus to avoid its adverse effect every dairy should implement a dystocia monitoring program and employ management practices that limit the occurrence and impact of dystocia.

Key words: Dairy Cow · Dystocia · Foeto-Pelvic Incompatibility · Reproductive Health Problems · Risk Factors

INTRODUCTION

Ethiopia is known to have huge number of livestock population [1]. Despite the huge livestock resource, the contribution for the economic aspect of the country is still lowest. Low economic returns from these resources are associated with several factors such as diseases, poor management and low genetic potential of indigenous breeds. Among which, reproductive health problems cause considerable economic loss to the dairy industry [2-4] due to slower uterine involution, prolonged inter conception and calving interval, negative effect on fertility, drop in milk production and early depreciation of potentially useful cows [5]. Thus, reproductive disorders are one of the most important problems that affect the production and productivity of dairy cows [6].

Dystocia is one of the important reproductive health problems of dairy cows that is commonly known as difficult calving and defined as prolonged or difficult parturition [7]. It has been estimated that between 2 and 23% of cows in a herd experience difficult calvings that require farmer or veterinarian assistance [8]. There are a variety of risk factors for dystocia such as breed, parity, weight and condition of cow at calving, sex and birth weight of calf, malpresentation, multiple calving and year and season of calving [9]. Foeto-pelvic incompatibility is

Corresponding Author: Nejash Abdela, School of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Jimma University, Jimma, Ethiopia. Cell: +251924124547.

the major reason leading to difficulty at calving. However, dystocia can result from other causes that interfere with the expulsive forces needed to expel the calf. This 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 [10]. Dystocia is much more common in primiparous than in multiparous cows [3-7] due to their smaller stature and the slow maturation of pelvic dimensions [11] but primary risk factors for dystocia are different in primiparous and multiparous cows [12].

Dystocia is an economically important and major problem in the dairy industry [13]. The total economic costs attributable to a severe case of dystocia have been estimated at up to _500 per case [14]. It is associated with approximately 50% of calf mortality cases at birth [8] but can also have a profound influence on cow performance [15]. Dystocia is an undesirable reproductive event resulting in increased risk of calf morbidity and mortality [12, 16] reduced fertility [17, 18] and milk production [13, 14, 19, 20] as well as cow survival [16, 21]. Moreover, dystocia may have negative effects on reproductive performance, causing stillbirth, cow death, retained placenta, uterine infections, or increased involuntary culling [12, 22]. The Other consequences of dystocia include veterinary fees, extra labor and other management costs [13]. Dystocia is also a welfare problem of cows and calves. It causes pain or pain and injury to the cow. Therefore, it directly leads to poor welfare in cows [23]. The motivation for this paper arises from recognition of the above situation of dystocia and its serious economic impact dairy cow. Therefore, the objectives of this systematic review were to review the risk factors of involved in dystocia and it economic impacts in dairy cow. Furthermore, the paper highlights the current Status of dystocia in Ethiopia.

Definition and General Aspect of Dystocia in Dairy Cow: There is a wide range of definitions for dystocia ranging from need for assistance to considerable force or surgery to extract the newborn [8, 10]. The term dystocia is from the Greek 'dys' meaning difficult and 'tokos' meaning birth. Eutocia or normal calving may be defined as a spontaneous calving of normal duration [24]. Dystocia is commonly known as difficult calving and defined as prolonged or difficult parturition is a problem most dairy producer's encounter [7]. It is a condition in which the first or especially the second stage of parturition was prolonged markedly for more than 6 h and the cow required assistance [25].

Dystocia occurs when there is a failure in one or more of the three main components of calving; expulsive forces, birth canal adequacy and foetal size and position. While all types of dystocia may occur in both heifers and older cows, the predominant types and risk factors differ between these parity groups. In heifers the primary types of dystocia, in descending order of importance, 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 foetuses, uterine inertia, uterine torsion and failure of the cervix to dilate. The dystocia rate can be up to three times greater in heifers compared to older cows [26].

There are several ways to assess difficulty at parturition (Also referred to as calving ease in cattle). Categorical scoring scales that allow for different degrees of difficulty are commonly used across species with ordinal scales with 3 to 5 rating points being popular in cattle [8]. Lower scores are usually given to the easiest births (Also called eutocial) and highest scores to the most difficult ones. For example, in the Iran, dystocia evaluations in the Holstein Friesian breed are currently performed using the following 5 point scale: 1 = unassisted, score 2 = slight assistance, score 3 = considerable assistance, score 4 = considerable force needed and score 5 = caesarian [27]. On the other hand, in the UK, genetic evaluations in the Holstein Friesian breed are currently performed using the following 4 point scale: "1 = easy; 2 = assisted; 3 = difficult; 4 = vet assisted" [28]. The evaluation of costs associated with dystocia scores enables dairy producers to predict the average future economic loss when an incident of dystocia is reported in the herd, allowing the producer to evaluate the relative importance of dystocia in individual herds [10].

Causes and Risk Factors of Dystocia: There are different causes and risk factors associated with dystocia in dairy cattle which can result from both maternal and foetal factors [29]. The maternal causes of dystocia are considered to be arising either because of the constriction/obstruction of the birth canal or due to a deficiency of the maternal expulsive force [29, 30]. The constriction/obstruction of the birth canal can result in maternal dystocia and can be due to pelvic abnormalities, vulvar or vaginal stenosis, neoplasms of the vagina and vulva, vaginal cystocoele, incomplete cervical dilation, uterine torsion and ventral dis- placement of the uterus. An uncommon cause of constriction of birth canal is carcinoma of urinary bladder. Pelvic abnormalities of the mother that can result in dystocia include small size of the pelvis pelvic deformities or exostoses, osteomalacia and hypoplasia of vagina and vulva [29]. Moreover, the cows with milk fever are developing dystocia 6 times more than that of normal cows. This is because of a reduced ability of smooth and skeletal muscle contraction causes for cow's long period in labour, which predisposes to dystocia [31].

Fetal Causes of Dystocia Include: Abnormal fetal presentation or position, fetal monsters, persomus elumbus and fetal oversize. An abnormal fetal position is described as any position that is not in the "cranial longitudinal presentation and in dorsosacral position, with the head, neck and fore limbs extended [32]. Even thouth Foeto-pelvic incompatibility (FPI) is the major reason leading to difficulty at calving, dystocia can result from other causes that interfere with the expulsive forces needed to expel the calf. This 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. Risk factors for weak labor include hormonal imbalances such as reduction in plasmatic oestradiol concentration, high levels of oestradiol-17ß at parturition [33] or high ratios of corti- sol to progesterone. These imbalances can decrease expression of oxytocin receptors in the uterus as well as changing the preparation of the soft tissues, causing weak uterine contractions and weak dilatation of soft tissues [10, 33]. Twin calves are a risk factor due to the increased possibility of malpresentation. In addition over- and under-condition of the dam are also risk factors [8]. Regardless of breed, twins, bull calves and heavier calves have an increased risk of experiencing dystocia [34, 35]. Furthermore, Genetic, environmental and management factors have varying degrees of influence on dystocia [8, 33, 36]. The most common risk factor for dystocia will be discussed as follows.

Foeto-Pelvic Incompatibility: Most commonly dystocia results from a physical incompatibility between the pelvic size of the mother and the size of the calf at birth, also called foeto-pelvic incompatibility (Or FPI) [8]. Because of this, a high calf birth weight is known to be an important risk factor for dystocia, as well as the choice of sire, breed and length of gestation. It also follows that male calves are also more likely to experience a dystocial birth because of their higher birth weight [37]. Calf birth weight and maternal pelvic size account for 50 and 5-10% of the phenotypic variance in dystocia, respectively [38]. In a study on Holstein cattle, Johanson and Berger [34] indicated that that the incidence of dystocia increased by 13% per additional kg of the calf's birth weight and decreased by 11% for an increase of 1 dm^2 of the pelvic size of the dam. Male calves, who are generally heavier at birth, are at higher risk of dystocia. Calves having high birth weights above 42kg and dams with a small pelvic size are particularly at risk of dystocia [39].

Foeto-pelvic incompatibility is largely influenced by the weight and morphology of the dam and the calf. The pelvic area available at birth is affected by the size of pelvis but also by fatness of the dam which might partially obstruct the birth canal. The calf 's physical factors contributing to a size mismatch between the calf and the dam may include a calf of a big size or malpresentation. These morphological factors are themselves dependent upon different variables including the age, breed and parity of the dam, twinning, the sex and weight of the calf, the sire and breed of the calf as well as the nutrition of the dam during gestation [8, 9, 13]. In order to avoid cases of FPI, it is particularly important for the animal caretaker to mate primiparous animals with bulls that are not expected to sire very large calves. This can be achieved by making an informed choice on their genetic potential for their expected ease of calving [13].

Foetal Malposition: foetal malposition occurs at a low prevalence (<5%), but It is the most common cause of dystocia in older cows accounting for 20 to 40% of cases [38]. Abnormal foetal position most commonly presents as posterior malpresentation, foreleg malposture, breech malpresentation or cranial malposture. Malpresented calves have a two-times higher risk of dystocia and a five-time higher risk of stillbirth [40].

Failure of the Expulsive Forces: Failure of expulsive forces could result because of the failure of abdominal or uterine expulsive forces. The condition where the uterine expulsive forces fail to deliver a fetus is known as *uterine inertia*. The uterus quietens and the progression of the fetus out of the birth canal does not follow because of lack of contractions in the uterus [29, 41]. Uterine inertia, where the cervix is fully dilated but uterine contractions are too weak to expel the foetus, is associated with approximately 10% of all dairy cattle dystocia, primarily in older cows [42]. Uterine inertia is classified conventionally into primary and secondary uterine inertia [29].

In primary uterine inertia cervical dilation occurs and the fetus is in normal presentation, position and posture but it is not delivered due to lack of uterine contractions. The process of birth begins but do not continue into second sage labor. The most common cause of primary uterine inertia in dairy cows is considered to be hypocalcaemia [43] with the animal showing signs of milk fever as calving is about to begin. Over distension of the uterus because of dropsical fetal conditions, general debility and environmental disturbances are other causes. A few of the less common causes described by Biggs and Osborne [44] include inherited weakness of uterine muscle, toxic infections, myometrial degeneration, senility and nervousness.

According to Arthur *et al*. [41], Secondary uterine inertia occurs due to exhaustion as a result of dystocia. When the uterine musculature becomes exhausted subsequent to failure of delivery of a maldisposed or oversized fetus or due to obstruction in the birth canal, then the condition is known as secondary uterine inertia. The contractions in the uterus then stop or become weak and transient. The animal shows no progress in parturition after the second stage of labor. The fetal membranes are ruptured and the cervix dilated. If dystocia is prolonged without fetal delivery, the fetal fluids are expelled out and the uterus contracts tightly around the fetus. It is necessary to correct the primary cause of dystocia and deliver the fetus. Doses of oxytocin must be given after fetal delivery to regain uterine contractility. Secondary uterine inertia invariably results in retention of the placenta [29].

Failure of the Cervix to Dilate: The incidence of cervical dystocia was seen to be from 11.1 to 16.7 percent in cows. Animals with delivery problems associated with the cervix are those that had already delivered many calves [45]. The dilation of the cervix at the time of delivery of fetus is essential for the easy passage of the fetus. A wide variety of changes in the hormonal milieu [46]. 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 [47]. An increase in inflammatory cytokines during parturition is known to effect dilation [48]. 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 some other poorly understood mechanisms and results in dystocia [29].

Uterine Torsion: Uterine Torsionis relatively uncommon (Approximately 5% of dystocia, primarily in older cows) but appears to be increasing in prevalence (10%) in veterinary assisted dystocia [49]. Furthermore, its incidence is considered to be higher in buffaloes compared to cows [29, 50]. 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 under stood. 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 [51]. The gravid uterus rotates about its long axis, with the point of torsion being the anterior vagina just caudal to the cervix (*Post cervical torsion*). It is probable that pregnancies occurring in the left horn may be rotating towards the left side, especially when rumen is partially filled. The degree of torsion is generally 90° to 180° although it can occur up to 360° or even more. Torsions up to 540° [52] or 760°[53] have been recorded. Because of the rapidity of fetal death that ensues following torsion and the uterine adhesions with visceral organs that develop, uterine torsion must be considered an emergency. Less commonly the point of torsion is cranial to the cervix (*Pre-cervical torsion*), Uterine torsion during pregnancy, at parturition, or post-partum is one of the complicated cause of maternal dystocia both in cows and buffaloes culminating in death of both the fetus and the dam if not treated early [29]. The intermediate risk factors for torsion of uterus are excessive foetal movement during stage one of calving as the foetus adopts the birth posture, increased uterine instability at term and possibly a deeper abdomen in some dairy breeds. Ultimate risk factors include foetal oversize and gender, debility and insufficient exercise [49].

Economic Impacts of Dystocia in Dairy Cow: Several studies have demonstrated the adverse effect dystocia has on the survival, health and production of calves and dams [12, 18, 39]. Dystocia is an undesirable reproductive event resulting in increased risk of calf morbidity and mortality [12, 16,] reduced fertility [17, 18] and milk production [13, 14, 19,] as well as cow survival [16]. The total economic costs attributable to a severe case of dystocia have recently been estimated at up to _500 per case [14]. In order of descending ?nancial importance, dystocia impacts production (41% of costs), fertility (34%) and cow and calf morbidity and mortality (25%), excluding costs associated with increased culling, veterinary costs and other management costs [54]. According to De Maturana *et al.* [55], calvings needing assistance or surgery increase culling risk by 18% when compared to unassisted calvings. Cows with easy calvings experience 2.5 more productive life months than cows having difficult calvings ($54 opportunity cost). Thus, a difficult birth can negatively impact the health, performance and survival of dairy calves, so reducing overall levels and severity of dystocia is important to animal welfare as well as to the economics of the farm [37].

Poor Survival in the Lactation: Dystocia can lead to the death of the cow in the most severe cases usually occurring within 48 hr [56]. Even beyond those 48 hr, cows that have experienced dystocia are more likely to die or be culled in early lactation and over the lactating period [18, 54, 57]. Moreover, the fear that the animal might experience difficulty at her next parturition may increase weight to the farmer's decision to cull a dystocial cow [39].

Lengthened Labour, Uterine Health and Fertility: Gaafar *et al.* [20] indicated that high incidence of dystocia can adversely effect the reproductive performance of dairy Friesian cows. The first estrus, first service, service period, days open and calving interval were significantly longer in cows that exhibited dystocia as compared to normal cows. Furthermore, their results have indicated that dystocia led to increasing the service interval, service period, days 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 [58]. This could be explained by the possibility of microbial contamination during assistance [59] combined with a depressed immune status during the peripartum period. This highlights the importance of good hygiene when intervention at calving is required. Immunodeficiency is probably enhanced in dystocial cows as a consequence of the increased duration of labour and the subsequent higher cortisol levels [60]. An increase in the number of days open, the number of services to conception 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 [54]. Gaafar *et al.* [20] indicated that 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 reduced by 10.7, 11.5, 12.02 and 12.5% as compared with normal cows, respectively. In general and poorer fertility is one economic impact of dystocia in dairy cow [55].

Poor Milk Production: Several studies have implicated dystocia as a contributing factor to reduced milk yield [13, 14, 19, 20, 54, 55]. It is not clear however, how long the adverse effect on milk production lasts for. In fact, although some authors seem to find a deleterious effect on the overall lactation of cows [10, 54] some studies have suggested that these effects disappear beyond 14 days in milk (DIM) [61] 90 DIM [62] or six month postpartum [18]. Furthermore, the degree of difficulty from which milk losses are reported ranges from slight degrees of difficulty [54] up to only in severe cases when surgery is needed [18]. Moreover, the magnitude of losses has been suggested to be greater with increasing degrees of difficulty [54]. However, the pattern with which milk losses vary is not always obvious and other factors such as the overall yield or parity of the cow [61] might influence it. As well, it is common for studies looking at milk production losses after a difficult calving to restrain their datasets to animals with full lactations or that have survived until a certain lactation stage.

Feed Intake and Metabolic Dysfunction: Cows that experience dystocia alter their feeding behavior beginning 3 d before calving and standing behavior beginning 12 hr before calving compared to cows that calve without assistance [63]. 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 was shown to decrease in cows that had experienced dystocia in the months postpartum [64] as compared to cows that calved normally, but this was not seen in the first two days postpartum [63]. 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 [19]. This may be related to changes in the metabolic function and lower immunocompetency in these animals [39].

The experience of dystocia in Holstein dairy cows is also associated with haematological 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 [60]. It is possible that such stress but also exhaustion, pain and human intervention during delivery may contribute to reduced or delayed maternal care of the calves in the first hours postpartum, as observed in ewes [65, 66].

Effects of Dystocia in the Dairy Calf: In addition to being a difficult experience for the cow, hard calvings are traumatic for the calf. Immediate physiological effects of dystocia can include: Stillbirth, Hypoxia (Deprived of adequate oxygen supply), acidosis, potential trauma, impaired temperature regulation and reduced absorption of IgG from colostrum [67]. Dystocial calves may not thermoregulate properly and achieve lower passive immunity. This may relate to higher morbidity [12] and possibly altered growth [68]. Dystocia results in a more severe acidosis than a normal, unassisted birth due to the increased time of hypoxia and anoxia during parturition. The longer the calves are in the transition between the uterine and extrauterine environment, the greater the probability of anoxia, resulting in a more severe acidosis. Dystocial calves frequently have a depressed central nervous system, which reduces the stimulation for respiration. This depression also results in decreased physical activity and might prevent calves from standing or taking longer than normal to stand [35].

Animals born from difficult births are more likely to fail in transition from foetal life to extra-uterine life and become stillborn or die within the few days of life [26, 34]. Approximately 50% of stillbirths are a direct result of a difficult calving [67]. Dystocial stillbirths usually result from internal and external trauma [69, 70]. But also from prolonged hypoxia (Deprivation of adequate oxygen supply) [39].

Dystocia calves that make it through the critical first few days of life are at increased risk for health issues throughout calfhood. Compared to heifer calves born to dams having no assistance, calves born to dams having dystocia experience increased: Treatment of respiratory disease, Treatment of digestive disease, Overall heifer mortality before weaning and before first service [71]. Study has identified detrimental side effects for the "hard-pull calf" that grows up to become a member of the milking herd. Compared with non-assisted calves, those delivered with assistance experience a delay in reaching peak milk yield and Show a loss in milk production as adult heifers [72]. Reduction in survival rates and milk production were seen when the calf reach an adult age [71-73].

The study by Lombard *et al.* [12] used a three-level dystocia scoring system with 1 indicating a normal, unassisted delivery; 2 indicating assistance by one person not using mechanical means; and 3 indicating that two or more people were required and mechanical or surgical assistance was required. In this study, the percentage of stillbirth calves (More correctly perinatal mortality, or calves dying at or immediately near calving) increased as the dystocia score increased. Only 3.2% of unassisted calves (Score of 1) were stillborn compared with 8.4% of calves with a score of 2 and 37.2% of calves with a score of 3 and overall, 8.2% of calves were stillborn.

Prevention and Management of Dystocia in Dairy Cow: Dystocia causes a huge loss in dairy cattle herds and cannot be predicted but can be reduced by superior management of one's herd [32]. Its management is easier if the specific physical traits, environmental or managerial situations that influence its prevalence are identified. Steps that can be taken to achieve a specific diagnosis include weighing replacement heifers at intervals from weaning to calving as two-year-olds, measuring yearling heifer pelvic areas, weighing calves at birth, recording calf birth dates, monitoring and recording pasture quality and quantity, monitoring and recording daily rainfall figures, collecting suitable samples to assess trace element status and recording comments for all assisted calvings. With this information, prospective and retrospective assessments can be made [74].

Preventative management strategies 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 size [75]. 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. Parturient cows should be observed no less frequently than every 3 hours and delivery should be assisted if the first or second stage of labor is prolonged". [32]. If the amnion sack is ruptured, indicated by a release of allantoic fluid and the cow or heifer has not given birth within two hours of the sack breaking, then assistance will be needed [32]. Furthermore, since genetic selection could improve calving performance, it is important to include calving traits, such as dystocia, in genetic evaluations [73].

In general dystocia control measures include avoiding matings 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 in early pregnancy may increase size and efficiency of the placenta, which disproportionately increases fòetal growth when adequate nutrition is restored [75].

According to Jason *et al*. [35] the prevalence and effects of dystocia can be reduced in three ways:

- Prebreeding management: select 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: providing maternal and additional care as needed to Stimulate respiration Maintain body temperature (Thermoregulation) and Increase blood volume via colostrum

Status of Dystocia in Ethiopia: Reproductive problems of dairy cow are common in Ethiopia. In the country, diary cattle are maintained under different production systems [76]. The differences in management (Production) systems and environmental conditions under which cattle are maintained could greatly affect the occurrence of reproductive health problems. It has been indicated that reproductive problems result in considerable economic losses to the dairy industry and are the main causes of poor productive performance of smallholder dairy farms [3]. A number of researchers have reported the prevalence dystocia in dairy cow from different area of Ethiopia and most of the reported prevalence of in dairy cows ranges from 2.9% to 11.6%. Tables 1 summarize the prevalence of dystocia in dairy cow from 1996- 2015. The lowest prevalence (2.9%) was reported from Central Ethiopia, Bishoftu by Hadush *et al.* [77]. Highest prevalence (11.6%) was reported from Mekelle by Mekonnin *et al.* [78]. Micheal [79] also reported 9.7% from Awassa and Haile *et al.* [80] reported 5.9% from Hosanna

Table 1: prevalence of dystocia in dairy cow in Ethiopia

Area	Prevalence	Reference
Hosanna (Southern Ethiopia)	5.9%	[80]
Debre Zeit (Central Ethiopia)	2.9%	[77]
East Shoa	3.3%	[81]
East Wollega	6.7%	[82]
Borena Zone	3.4%	[5]
Bedelle (South western Ethiopia)	6.6%	[83]
Holleta	5.5%	[84]
Holleta	7.8 %	[85]
Alage	3.1%	[86]
Mekelle	3.7%	[87]
Awassa	9.7%	[79]
Debre Zeit	5.8%	[88]
DebreZeit	5.79%	[89]
Kombolcha (Northeast Ethiopia)	7.75 %	[4]
Mekelle	11.6%	[78]
Adama	6.95%	[3]
Holleta	7.5%	[90]
Holetta	7.8%	[91]
Awassa	9.65%	[92]
Kombolcha	4.3%	[93]
Jimma	3.8%	[94]

CONCLUSION

Dystocia is one of the reproductive health problems of dairy cows characterized by prolonged or difficult parturition. It is economically important and major problem in the dairy industry. Dystocia has negative impacts on the farm, the cow and the calf. Dystocia 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 welfare. With respect to the calf dystocia is associated with higher mortality in the immediate post-natal period and it is related with 50% of preweaned calf losses. However, there has been less attention paid to the effects of a dystocial 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. While it is not possible to eliminate dystocia, adequate management of heifers during their development (Adequate feeding, selection of a sire with a negative expected progeny difference for birth weight) and close observation of cows and heifers during calving are essential for reducing calf losses. To avoid dystocia adverse effect, every dairy should implement a dystocia monitoring program and employ management practices that limit the occurrence and impact of dystocia. It is also very important to avoid birth injuries and infection of the reproductive tract during assistance, which is more likely to occur in cows with dystocia. Dystocia significantly decrease lactation performance, so in any economic evaluation of dystocia, not only the lost calf, veterinary costs, the reduced survival and the increased days open should be taken into account. Finally genetic selection could improve calving performance thus, it is recommended to include calving traits, such as dystocia, in genetic evaluations.

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