Global Veterinaria 20 (2): 60-72, 2018
ISSN 1992-6197

DOI: 10.5829/idosi.gv.2018.60.72

Common Reproductive Disorders of Dairy Cattle and Their Prevalence in Ethiopia

[1]Getnet Zemenu, [1]Haimanot Belete and [2]Wahid M. Ahmed

[1]Addis Ababa University, College of Veterinary Medicine and Agriculture,
P.O. Box: 34, Bishoftu, Ethiopia
[2]Department of Animal Reproduction & A.l, Veterinary Research Division,
National Research Centre, Giza, Egypt

Abstract: The huge number of dairy cattle population places Ethiopia the first in Africa. Despite this fact productivity is low due to many constraints, the most important of which are reproductive disorders. This review is aimed to compile up and compose previous works on the occurrence and prevalence of the major reproductive disorders that have direct impact on reproductive performance of dairy cows including abortion, dystocia, retained fetal membrane (RFM), pyometra, metritis, uterine and vaginal prolapse, anoestrus and repeat breeding, to make some comparisons and to infer from these comparisons and also to show future liability. These reproductive disorders of dairy cattle that delay gestation include anoestrus and repeat breeding; those occur during gestation include dystocia and abortion; and disorders post parturition include retained placenta and pureperial infection (endometritis). Wide arrays of dairy cows reproductive disorders are reported from Ethiopia. However, most of them are limited in area coverage and mainly are from central high lands especially at some distance from the capital, Addis Ababa and only few are from Eastern and Northern parts of the country. Likewise, there is no compiled review article on dairy cows reproductive disorders in Ethiopia. To minimize economic loss due to reproductive disorders will require educating farm owners how to improve their farm hygiene, manage their animals during and after parturition, increasing the study area to be aware about the distribution of the problem and concentrating on the current status of the incidence of reproductive disorders.

Key words: Dairy Cattle · Ethiopia · Prevalence · Reproductive Disorders

INTRODUCTION

Ethiopia has a huge cattle population inventory in Africa, which is estimated to be about 59.5 million heads and out of this total cattle population the dairy-cows constitute to be around 7.16 million and milking cows are about 11.83 million [1]. However, the dairy industry is not developed compared to that of other East African countries such as Kenya, Uganda and Tanzania due to constraints of nutrition, poor management practices, diseases and reproductive disorders [2]. Reproductive disorders are one of the most important problems that affect the production and productivity of dairy cows [3]. Among the major reproductive disorders that have direct impact on reproductive performance of dairy cows are abortion, dystocia, retained placenta, pyometra, metritis, uterine and vaginal prolapse, anoestrus and repeat breeding. Most common reproductive disorders occur during postpartum period which is the most vulnerable period and coincides with the maximum of milk production, uterine involution, resumption of ovarian activity and conception [4]. These reproductive disorders have a direct and indirect effect on fertility and hence productivity.

Fertility is one of the key determinants of the life time performance of a cow. For dairy cows, it is necessary for a calf to be produced every 365 days. Regular breeding depends upon the normal function of the reproductive system. When the function of the reproductive system is impaired, cows fail to produce a calf regularly [5], have longer intervals from calving to first service and to conception and require more services per conception [6]. Major infertilities are anoestrus and repeat breeding [7].

Corresponding Author: Haimanot Belete, Addis Ababa University, College of Veterinary Medicine and Agriculture, P.O. Box: 34, Bishoftu, Ethiopia.

Reproductive disorders of dairy animals are broadly studied throughout the world. Studies in Ethiopia are limited in few areas and farming systems mainly focusing to towns and their peri-urban areas of central highlands and some parts of Eastern and Northern parts of the country [8]. Likewise, information from these studies has not yet compiled into figures that indicate the extent of reproductive disorders of dairy cows in Ethiopia. Therefore, the objectives of this paper are to review on common reproductive disorders of dairy cattle and as well to compile a comparative data on the prevalence of each reproductive disorder of dairy cattle in various parts of Ethiopia.

Reproductive Disorders That Delay Gestation

Anoestrus: Absence of periodic manifestation of oestrus without pregnancy is anoestrus. In this condition there is insufficient stimulus from pituitary for secretion of Follicle-Stimulating Hormone (FSH) or Luteinizing Hormone (LH) resulting in failure of maturation and rupture of Grafian follicle. It can be caused by pathological conditions of the ovary. Malnutrition due to non-availability of feeds or physiological problems in assimilation may also lead to anoestrus [7].

Anoestrus Due to Ovarian Abnormalities

Ovarian Cysts: Some cysts are purely follicular and are characterized by thin walls and low or basal progesterone levels, whilst others (luteinized cystic follicles) have thicker walls and produce significantly raised progesterone levels [9]. Thick-walled, luteinized cysts may occur if there is enough LH released to cause some luteinization, but that the pre-ovulatory LH surge is blocked, reduced in magnitude or delayed so that, in effect, a partially functioning corpus luteum (CL) forms around the dominant follicle that has failed to ovulate. Luteinized cysts may persist over long periods and this can result in frequent and erratic estrus behavior, often known as nymphomania. If the condition persists, affected cows tend to produce increasing levels of testosterone and may eventually begin to exhibit virilism, i.e. male aggressive and sexual behavior. Alternatively some cystic cows remain behaviorally anoestrous and inactive [10].

Ovarian Hypoplasia: The hypoplastic ovary is essentially an underdeveloped ovary that does not function properly. The condition is characterized by incomplete development, or ovarian dysgenesis, so that the ovary is lacking in primordial follicles [11]. Animals having such conditions are sexually anoestrus and it is common causes of culling and slaughtering of female cattle [12]. Ovarian abnormalities, inactive ovaries, are the causes of true anoestrus.

Anoestrus Due to a Lack of Detected Heat Symptoms and Negative Energy Balance: It is obvious that the intensity, with which estrus symptoms are expressed by the cow and hence can be observed by the herd's man, is a very subjective matter. Apparently cows experiencing a severe negative energy balance can produce enough estrogens to elicit an LH surge and ovulation, but not enough to cause heat, resulting in an ovulation without heat symptoms [13]. It is well established that poor nutritional status and negative energy balance (NEB) are responsible for the majority of anoestrus cases in both dairy and beef cattle (Figure 1). Thus it is suggested that the presence of minimal progesterone levels, being released by the breakdown of fat during the period of NEB around the moment of ovulation, can seriously depress the expression of heat symptoms [14].

The Prevalence of Anoestrus in Dairy Cattle in Ethiopia: Anoestrus has been reported from different farms, small holders and research stations of Ethiopia. Different studies indicated that the prevalence of anoestrous ranges from 0.3% in Jimma [15] to 38.6% of central highlands of Ethiopia [6]. The prevalence of anoestrus in different parts of Ethiopia varies by places, farms and years of study. When prevalence generated from the same study areas was compared by different years, there is fluctuation and there is no constant increase or decrease. From central high lands of Ethiopia, the prevalence varied from 16.4 % [16], 24% [17] and 38.6% and [6]. This might be due to variation in generating data as most of this studies are questionnaire based, may be variation in heat detection, breed differences and management system differences [8]. There was also a variation when the prevalence generated from different study areas was compared by the same study years. Thereby, 1.7% of prevalence [18] was reported in and around Bedelle fluctuates as compared to 0.3% [15] of prevalence of anoestrus was recorded in Jimma town, Southwest Ethiopia. The lower prevalence of anoestrus obtained in some studies could be due to better heat detection practices and on time insemination, better management and adequate reproductive records. Besides, other management systems particularly, nutrition in farm animals could also have a strong effect on the reduction of anoestrus prevalence in dairy cattle.

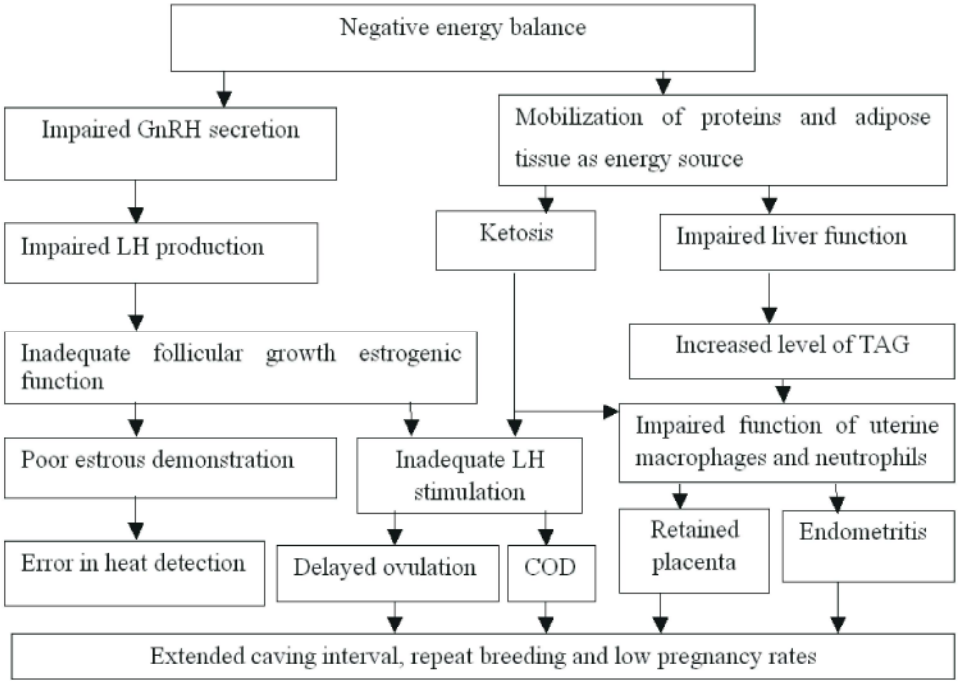

Fig. 1: Associations between negative energy balance and some endocrine and immune functions in dairy cows. Source: [14]

There are researchers who proposed that the high rate of anoestrus was due to genital infections [6, 19] and crossbreeds were more affected than indigenous cattle [18]. That is because of Zebu cattle are adapted to tropical conditions of high temperature and humidity, diseases and low quality of feed than the European breeds [20]. Table (1) sumerizes the prevalence of anoestrus from different parts of Ethiopia with respective studied years.

Repeat Breeding: The term repeat breeder or repeat breeder syndrome (RBS) describes cows that failed to conceive after 3 or 4 inseminations. Repeat breeder females return to service repeatedly after being bred with a fertile male these cows exhibit normal signs of estrus every 18 to 24 days but require more than 3 services to become pregnant [34]. Fertilization failure and early embryonic mortality are two major causes for repeat breeding problem. Most of the time fertilization failure accounts for about 40 % of the repeat breeder cows. It may be due to failure of ovulation, delayed ovulation, defects in the ovum, poor quality of the semen used, low sperm concentration, poor motility, improper handling of semen and AI, inflammatory conditions and anatomical defects of the genital tract of a cow. Embryonic death may be due to cytogenetic abnormalities (Chromosomal aberrations) of the early embryo, unfavorable uterine environment by hormonal imbalances, uterine infections, nutrition, environmental stress and immunological factors. Most of the embryonic death occurs between 8 and 19 days after breeding before the critical stage of maternal recognition of pregnancy [14].

The Prevalence of Repeat Breeding in Dairy Cattle in Ethiopia: The prevalence of repeat breeding in cows ranges from 1.3% [15] from Jimma to 28% [29] from Addis Ababa Abattoir. However, Haile *et al.* [35] reported 6.2% prevalence of repeat breeding from Addis Ababa milk shed. The most probable difference in prevalence in this two studies could be difference in study sites as most of cows coming to abattoir are infertile than those in milk shed. Mekonnen [36] has reported a prevalence of 21.8% repeat breeder from Ada'a while Esheti and moges [37] reported 15.9% prevalence yet again from Ada'a, Oromia, Ethiopia. Many factors could be sought for this variation in prevalence, among which could be study sites and study types, poor management practices such as incorrect timing of insemination, faulty heat detection [38] and communal use of a bull for natural services are also contributing factors [15]. Repeat breeder can be caused by a number of factors including sub-fertile bulls, endocrine imbalance, malnutrition and reproductive tract infections.

Table 1: The prevalence of anoestrus in dairy cattle as per study year in Ethiopia

Districts	Prevalence (%)	Literature cited	Year
Addis Ababa	30%	[21]	1990
Debre Zeit, ILCA herd	0.7-20.4%,	[22]	1992
Central high lands of Ethiopia	16.4 %	[16]	1998
Holleta	38.5%	[19]	1999
Kombolcha	1.7%	[23]	2003
Kombolcha	4.6 %.	[24]	2003
Holleta	26.8%	[25]	2004
Central highlands of Ethiopia	38.6%	[6]	2005
Alage dairy farm	10.2%	[26]	2006
Central highlands of Ethiopia	24%	[17]	2007
Dire-Dawa	17.1%	[27]	2008
Bako	2.29%	[28]	2009
Addis Ababa Abattoir	36.6%	[29]	2009
Adama (Nazareth)	1.48%	[30]	2011
Bedelle	1.7%	[18]	2011
Jimma	0.3%	[15]	2011
Debre Zeit	12.9%	[31]	2013
Borena	10.3%	[32]	2014
Hosanna	10.26%	[8]	2014
Mekelle	37.8%	[33]	2015

Table 2: List of the prevalence of repeat breeding in dairy cattle of Ethiopia

Locations	Prevalence (%)	Literature cited	Year
Ada'a	21.8%	[36]	2000
Hawassa	13%	[39]	2003
Holleta	4.6%	[25]	2004
Adama	8.9%	[40]	2005
Alage dairy farm	9.6%	[26]	2006
Adama	8.91%	[41]	2007
Bako	8.72%	[28]	2009
Addis Ababa Abattoir	28%	[29]	2009
Addis Ababa milk shed	6.2%	[35]	2010
Bedelle	3%	[18]	2011
Jimma	1.3%	[15]	2011
Asella town	26.8%	[3]	2013
Bishoftu (Debre Zeit)	11.42%	[31]	2013
Kombolcha	3.87%	[42]	2013
Borena	10.3%	[32]	2014
Hosanna	13.08%	[8]	2014
Ada'a	15.9%	[37]	2014
Mekelle	21%	[33]	2015

The higher prevalence of repeated breeding (26.8%) has been reported in and around Asella town by Hunduma [3]. Micheal [39] and Hadush *et al.* [31] have also indicated the higher prevalence (13% and 11.42%, respectively) of repeat breading from different parts of Ethiopia. The difference between the findings of the different studies might also be attributed to the climatic condition of the area and managerial factors [28]. The details of the prevalence of repeat breeding in dairy cattle are presented in Table 2.

Reproductive Disorders During Gestation

Dystocia: Dystocia, more commonly known as difficult calving, defined as a prolonged or difficult parturition varies from the need for increased producer attention to the loss of the cow and calf [43, 44]. It is one of the most important obstetrical conditions and requires immediate attention by the veterinarians. Bovines are the most commonly affected species with dystocia, which develops when the birth process is hindered by some physical obstacle or functional defects [45]. Dystocia can be maternal and/or fetal in origin. Maternal causes may be due to anatomical or pathological defects in the birth canal which includes the bony pelvis, uterus, cervix, vagina or vulva and failure of uterine contractions (inertia) which is the most likely defect of the expulsive forces. However, the most common causes of dystocia in cows are fetal in origin and these are invariably due to either fetal over size or abnormal disposition of the fetus. Fetal mal-positions including abnormalities of presentation; posterior or breech presentation (posterior with the hind legs forward), postural abnormalities; flexion of the forelimbs and lateral deviation of the head are also common causes of dystocia [10]. Figure (2) summarizes the causes and risk factors of dystocia in dairy cattle.

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 fetal position and failure of the

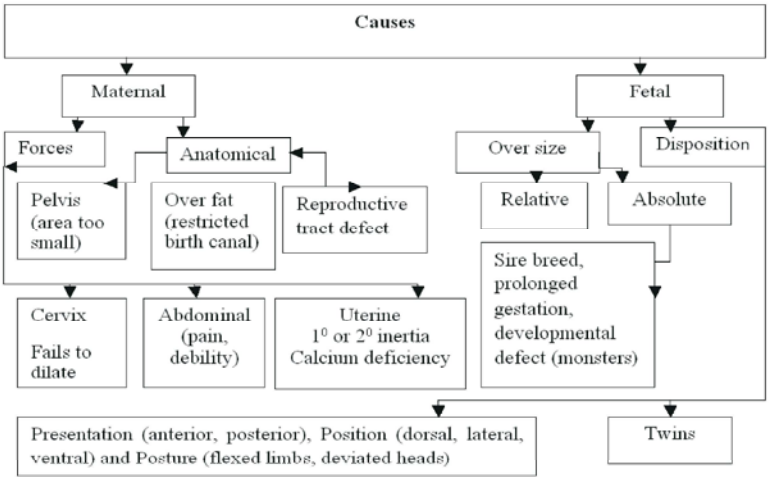

Fig 2: The common causes and risk factors of dystocia
Source: [10]

Table 3: List of the prevalence of dystocia in dairy cattle in Ethiopia

Districts	Breed	Prevalence %	Literature cited	Year
Bishoftu, ILCA herd	Z and CB	2.2-4.4%	[22]	1992
Mekelle	Z and CB	3.7%	[50]	1996
Holleta	CB	5.5%	[19]	1999
Holleta	Z and CB	7.8%.	[48]	1999
Hawassa	Z and CB	9.7%	[39]	2003
Kombolcha	Z and CB	4.3%	[23]	2003
Hawassa	Z and CB	9.65 %	[51]	2003
Bishoftu (Debre Zeit)	Z and CB	5.79%	[52]	2004
Holleta	Z and CB	7.5%	[25]	2004
Adama (Nazareth)	Z and CB	6.95%	[40]	2005
Alage dairy farm	HF	3.1%	[26]	2006
Bako	Z and CB	2.75%	[28]	2009
Bedelle	Z and CB	6.6%	[18]	2011
Jimma	Z &CB	3.8%	[15]	2011
Adama (Nazareth)	Z &CB	6.95%	[41]	2007
Central Ethiopia	NS	2.9%	[31]	2013
Horro-Guduru	Z and CB	1.4%	[53]	2013
Kombolcha	NS	7.75%	[42]	2013
Hosanna	CB and Z	5.9%	[8]	2014
Ada'a district	CB	3.3%	[37]	2014
Wolaita sodo	NS	0.79%	[47]	2014
Mekelle	CB	11.6%	[33]	2015
Guto Gida	Z	1.89%	[49]	2015

Legend: CB - Crossbred; HF - Holstein Friesian; NS - Nonspecific; Z - Zebu

vulva to dilate. In older cows, the primary types of dystocia are abnormal fetal position, oversized calves, multiple fetuses, 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 [46].

The Prevalence of Dystocia in Dairy Cattle of Ethiopia: ystocia was reported from different regions and towns of Ethiopia with prevalence ranging from 0.79% from Wolaita Sodo [47] to 11.6% from Mekelle [33]. Even from the same study sites within the same year the prevalence of dystocia was reported differently. For example, Yoseph [19] from Holetta reported 5.5% prevalence and during the same year from Holetta again Melkamu [48] reported 7.8%. There are also earlier reports during the year 2015, which shows higher degree of fluctuation of prevalence, so as Mekonnin *et al.* [33] 11.6% from Mekelle and Tilahun *et al.* [49] 1.89% from Guto Gida even if

Mekonnin *et al.* have conducted prevalence of dystocia in cross breed animals. This wide variation in the prevalence of dystocia might be due to the fact that it is influenced by factors such as the age and parity of the dam as well as breed of the sire. The details of the prevalence of dystocia in relation to cows breed in different regions and towns of Ethiopian were shown below (Table 3).

Abortion: Abortion in dairy cattle is commonly defined as a loss of the fetus between the age of 42 days and approximately 260 days. Pregnancies lost before 42 days are usually referred to as early embryonic deaths, whereas a calf that is born dead between 260 days and full term is defined a stillbirth [54]. Abortion results from premature initiation of parturition when normal relationships between fetus and dam fail. This results in the expulsion of a fetus that is incapable of independent life. Abortion can occur at any time during gestation, but most of them are observed during the second half. Most abortions that occur during the first trimester of pregnancy are unnoticed and the animal is treated clinically for infertility. In general, premonitory signs are usually lacking [55].

A low rate of abortions is usually observed on farms and 3 to 5 abortions per 100 pregnancies per year is often considered "normal" [54]. However, the losses of any pregnancy have a highly negative impact on reproductive efficiency, resulting in significant economic losses for the cattle industry [56]. Bovine abortion may be due to infectious or non-infectious agents (toxic, endocrine, physical or nutritional causes). Infectious agents associated with abortion in cattle include viruses, bacteria, protozoa and fungus [55]. The exact proportion of cases due to infectious agents is not known, but in 90% of cases in which an etiologic diagnosis is achieved the cause is infectious [57].

The Prevalence of Abortion in Dairy Cattle in Ethiopia: Abortion in dairy cows was reported from different regions and towns of Ethiopia with prevalence ranging from 0.63% [47] from Wolaita Sodo to 16.3% from Ghibe valley [20]. The higher report of abortion (16.3%) of Tekilye *et al.* [20] could most probably be due to Trypanosomosis induced abortion as Ghibe valley is in the belt of tsetse fly. However, Hunduma [3] has reported higher prevalence of abortion (14.6%) from dairy cows in and around Asella town which is not in the tsetse belt area. The variation in prevalence of abortion could be due to difference in prevalence of the causative agents or it could be related to any other factors. The list of the prevalence of abortion in different districts and towns are presented (Table 4).

Vaginal Prolapse: Eversion and prolapse of the vagina, with or without prolapse of the cervix, occurs most commonly in cattle and sheep. This condition is usually seen in mature females in the last trimester of pregnancy. Predisposing factors include increased intra-abdominal pressure associated with increased size of the pregnant uterus, intra-abdominal fat, or rumen distention superimposed upon relaxation and softening of the pelvic girdle and associated soft-tissue structures in the pelvic canal and perineum mediated by increased circulating concentrations of estrogens and relaxin during late pregnancy. The prolapse begins as an intussusception-like folding of the vaginal floor just cranial to the vestibule-vaginal junction. Discomfort caused by this eversion, coupled with irritation and swelling of the exposed mucosa, results in straining and more extensive prolapse. Eventually the entire vagina may be prolapsed, with the cervix conspicuous at the most caudal part of the prolapsus [61].

The Prevalence of Vaginal Prolapse in Dairy Cattle of Ethiopia: The prevalence of vaginal prolapse has been reported in various areas of the country in so doing, it was less prevalent and important disorder of the dairy cattle. The prevalence ranges from 1.03% [8] in Hosanna which is relatively low to 5.6% [15] in Jimma, south west Ethiopia. Moreover the prevalence of 5.2% of vaginal prolapse in and around Wukro was lined up [62]. Dawite and Ahmed [42] and Hadush *et al.* [31] have reported 1.24% and 1.95% prevalence rate of vaginal prolapse, within the same year (2013), in kombolcha and Central Ethiopia, respectively. Mekonnin *et al.* [33] have reported 2.0 % prevalence of prolapsed uterus/vagina in dairy cattle in and around Mekelle, Tigray, Ethiopia. The 2.7% [32], 1.9% [48], 1.7% [18] and 1.3% [23] and 1.05% [63] rate of prolapse of vagina and uterus has also been reported in cows from Borena, Holleta, Bedelle and Kombolcha, respectively. This minimal variation could be due to inter-relationship between different reproductive problems as predisposing factors for each other [8].

Postpartum Reproductive Disorders

Retained Placenta: Expulsion of the fetal membranes is the third stage of labour and is usually accomplished within 6 hours of parturition. However, in some cows the fetal membranes are not expelled normally but may remain attached to the uterine caruncles for a variable period after

Table 4: List of the prevalence of abortion in dairy cows of Ethiopia

Districts	Prevalence (%)	Literature cited	Year
Around Addis Ababa	2.2%	[58]	1990
Ghibe vally	16.3%	[20]	1991
Central high lands of Ethiopia	1.7-20.2%	[59]	1991
Bishoftu (ILCA)	1.5-7.8%	[22]	1992
Mekelle	6.1%	[50]	1996
Holleta	11.1%	[19]	1999
Holleta	5.33%	[60]	1999
Ada'a	5.4%	[36]	2000
Hawassa	6.30%	[51]	2003
Kombolcha	3.19%	[23]	2003
Holleta	6.3%	[25]	2004
Adama	2.23%	[40]	2005
Adama	2.23%	[41]	2007
Bako	5.96%	[28]	2009
Bedelle	13.9%	[18]	2011
Jimma	1%	[15]	2011
Assella	14.6%	[3]	2013
Kombolcha	9.05%	[42]	2013
Central Ethiopia	6.7%.	[31]	2013
Ada'a	5.3%	[37]	2014
Hosanna	2.56%	[8]	2014
Wolaita Sodo	0.63%	[47]	2014
Borena	12.2%	[32]	2014
Mekelle	6.4%	[33]	2015
Guto Gida	11.32%	[49]	2015

parturition [38]. Thereby, retention of fetal membranes from 6-24 hours post parturition is defined as retained placenta [63]. Retention of placenta occurs after abortion or parturition as a result of inflammation characterized by swelling, edema or fibrosis which prevents the separation of chorion from endometrium [64]. The direct cause of this condition is uncertain, but it is related to a deficiency of myometrial contractions. Consequently, placental retention is usually accompanied and followed by delayed involution of the uterus [38]. There are number of common causes that predispose for retention of fetal membranes, including mechanical, nutritional; managemental and infectious factors. Dystocia, caesarean section, uterine torsion, abortion, stillbirth and twin birth are mechanical causes of RFM [65].

The Prevalence of Retained Placenta in Dairy Cows of Ethiopia: Retained fetal membrane has been one of the major reproductive disorders identified from different areas of the country. Just like the prevalence of above mentioned reproductive disorders there is a huge variation in prevalence of retained fetal membrane. The prevalence in general from Central Ethiopia showed some comparisons although not identical. For example, from Adama Gizaw *et al*. [30] reported 12.9% while from Bishoftu Mamo [52] reported 14.28% prevalence. Shiferaw *et al.* [6] 14.7% prevalence from Central high lands and Haile *et al.* [35] reported 14.7% prevalence from Addis Ababa milk shed. All these authors reported prevalence in range of 12.9% to 14.7% is very close to each other. As these areas are also close to each other, they may easily share either causes of retained fetal membrane or the possible predisposing factors. Some other studies (Table 5) reported lower prevalence of RFM, which could be due to good management especially feeding and good sanitation [31]. The details of the occurrence of retained fetal membrane in different parts of Ethiopia are summarized in Table 5.

Uterine Prolapse: Prolapse of the uterus normally occur during the third stage of labour at a time when the fetus has been expelled and the fetal cotyledons has separated from the maternal caruncles. The cause of prolapse of the uterus is not clear, but the only conceivable force that could lift the heavy uterus out of the abdomen into the pelvis and thence propel it to the exterior is abdominal straining [67]. Among the reproductive disorders, complete uterine prolapse is always an extremely serious condition in any farm animal. A prolapsed uterus is highly prone to mechanical injury or trauma and environmental contamination and this may lead to increased maternal morbidity and even to the death of the animal owing to

Table 5: List of the prevalence of RFM in dairy cattle of Ethiopia

Locations	Prevalence (%)	Literature cited	Year
Ministry of agriculture farm (Central Ethiopia)	7.1-28.9%	[66]	1992
Mekelle	16.8%	[50]	1996
Kombolcha	7.1-28.9%	[23]	2003
Holleta	10.6%	[25]	2004
Bishoftu (Debre Zeit)	14.28%	[52]	2004
Central high lands	14.7%	[6]	2005
Alage dairy farm	26.6%	[26]	2006
Dire-Dawa	19.4%	[27]	2008
Bako	6.88%	[28]	2009
Addis Ababa milk shed	14.7%	[35]	2010
Bedelle	8.6%	[18]	2011
Jimma	19.2%	[15]	2011
Adama	12.9%	[30]	2011
Central Ethiopia	3.8%	[31]	2013
Kombolcha	7.32%	[42]	2013
Borena	7.6%	[32]	2014
Hosanna	7.18%	[8]	2014
Wolaita Sodo	3.36%	[47]	2014
Mekelle	11.6%	[33]	2015

Table 6: The prevalence of uterine prolapse in dairy cattle as per study year in Ethiopia

Districts	Prevalence (%)	Literature cited	Year
Kombolcha	1.3%	[23]	2003
Adama	1.24%	[41]	2007
Bako	0.92%	[28]	2009
Bedelle	1.7%	[18]	2011
Jimma	0.5%	[15]	2011
Kombolcha	0.56%	[42]	2013
Borena	2.7%	[32]	2014
Mekelle	2.9%	[33]	2015

trauma, laceration, subsequent hemorrhage, tissue necrosis and bacterial contamination, some time urinary incontinence, hypocalcaemia, stress incontinence and shock [68].

The Prevalence of Uterine Prolapse in Dairy Cattle of Ethiopia: Uterine prolapse has been reported in various small and medium scale production systems in different towns, districts and regions of Ethiopia (Table 6). The prevalence of it has been reported with the range from 0.47% [47] of Wolaita Sodo to 2.7% [32] form Borena. Within the same year Adane *et al*. [8] have reported 0.76% prevalence of uterine prolapse in urban and peri-urban area of Hosanna, Southern Ethiopia.

Endometritis/Metritis and Pyometra: Endometritis is an inflammation of the endometrium, the mucous membrane internal lining of the uterus, which occurs as a result of infection commonly by bacteria. Infection normally ascends into the uterus via the vagina particularly at service or around parturition. During and after parturition, a wide range of microorganisms ascend from the environment, invade the birth canal and colonize the uterus of dairy cows [69]. Some organisms such as *Campylobacter fetus* and *Trichomonas fetus* cause a specific endometritis but this condition is also caused by non-specific opportunistic bacterial invaders; *Corynebacterium pyogenes*, *Escherichia coli* and *Fusobacterium necrophorum* [70]. Endometritis often occurs as a sequel to dystocia and/or retained placenta and may be connected with a decreased rate of involution of the uterus in the postpartum period. It is often associated with a persistent CL. which tends to make the condition self-perpetuating, since there is no oestrus to help clean out the uterus [71].

Pyometra is an accumulation of pus inside the uterus and usually occurs in association with persistence of the corpus luteum. Pyometra can occur as a sequel to chronic endometritis [72]. It may also result from the death of an embryo or fetus with subsequent infection by *Corynebacterium pyogenes.* The uterus is under the influence of progesterone from the corpus luteum and the cervix is distended. Release of *Prostaglandin F2α* (*PGF2α*) is prevented due to endometrial damage. The uterine horns are invariably distended, although to a variable degree. The situation may persist undetected for a considerable time since the animal may be thought to be pregnant. Oestrogens followed by oxytocin can be used to treat the condition, but *PGF2α* is probably more effective [10].

Table 7: List of the prevalence of endometeritis/metritis in dairy cattle of Ethiopia

Districts	Prevalence (%)	Literature cited	Year
Bishoftu, ILCA	3.1-9.9%	[22]	1992
Mekelle	16.6%	[50]	1996
Holleta	25.5%	[48]	1999
Holleta	16.7%	[19]	1999
Kombolcha	18.7%	[23]	2003
Hawassa	11.5-13.6%.	[51]	2003
Bishoftu (Debre Zeit)	11.5-13.6%.	[52]	2004
Central high lands	15.5%	[6]	2005
Adama (Nazareth)	16.63%	[41]	2007
Dire-Dawa	15.2%	[27]	2008
Bako	3.21%	[28]	2009
Bedelle	16.9%	[18]	2011
Jimma	2.0%	[15]	2011
Horro-Guduru	5.6%	[53]	2013
Central Ethiopia	8.7%	[31]	2013
Ada'a	1.2%	[37]	2014
Wolaita Sodo	2.84%	[47]	2014
Mekelle	6.6%	[33]	2015

The Prevalence of Endometritis in Dairy Cattle of Ethiopia: Endometritis in dairy cattle has been reported in different districts and regions of Ethiopia which ranges from relatively low (1.2%) of Ada'a [37] and higher prevalence (25.5%) of Holleta [48] The variation in the prevalence of endometritis compared could probably due to differences in the management system in each of the above studies under which the animals were maintained and especially postpartum cow management and hygiene [41]. The details of the occurrences of endometritis/meteritis in dairy cattle in various towns, districts and regions of Ethiopia were compiled below (Table 7).

CONCLUSION

Reproductive disorders such as abortion, metritis, RFM, dystocia, anoestrus, repeat breeder and uterine and vaginal prolapse are all reported from different parts of Ethiopia and hence affect the reproductive performance of the dairy cows. The prevalence, not incidence, of reproductive disorders in dairy cattle has been studied in limited areas or districts of particularly; central high lands and in some parts of Eastern and Northern parts of the country. In some areas or farms the prevalence was very high, beyond the tolerable limit and economic loss wouldn't be low. When compared by years of study and study sites or farms the variations in prevalence of these reproductive disorders were tremendous. This might be accounted to the poor management at calving, poor reproductive management, inadequate nutrition and lack of regular follow up by owners, lack of facilities to screen or monitor animals and removal of predisposed animals. In order to alleviate those reproductive disorders, production and reproduction constraints, the following recommendations were suggested.

- Farm owners should be trained on farm hygiene, management and handling of cows at the time of parturition; follow up and manage reproductive records.
- Study with a wide area coverage, standardized method and if possible within the same year should be conducted to have country wide image of reproductive disorders.
- Work on incidence might better indicate the status of reproductive disorders as prevalence studies also include older and non existing cases. Therefore, future studies should concentrate on incidence of reproductive disorders.

REFERENCES

1. CSA (Central Statistical Agency), 2016/17. Agricultural Sample Survey, Vol. II: Report on livestock and livestock characteristics (private peasant holdings); Statistical Bulletin 585, Addis Ababa, Ethiopia.
2. Zegeye, Y. , 2003. Imperative and challenges of dairy production, processing and marketing in Ethiopia. In: Jobre, Y. and Gebru, G. challenges and opportunities of livestock marketing in Ethiopia proceeding of the 10th annual conference of the Ethiopia society, Theriognology, 43: 989-1000. Animal production (ESAP) Held in Addis Ababa, Ethiopia, 22-24 August 2002. ESAP, Addis Ababa, Ethiopia, pp: 61-67.
3. Hunduma, D., 2013. The major reproductive disorders of dairy cows in and around Asella town, Central Ethiopia. Journal of Veterinary Medicine and Animal Health, 5: 113-117.
4. Lobago, F., M. Bekana, H. Gustafsson and H. Kindahl, 2006.Reproductive performances of dairy cows in smallholder production system in Selalle, Central Ethiopia. Tropical Animal Health and Production, 38: 333-342.
5. Arthur, G., D. Noakes, T. Parkinson and G. England, 2001. Veterinary reproduction and Obstetrics. 8th Edition, London, Ballier Tindall, pp: 495-498.

6. Shiferaw, Y., B. Tenhagen, M. Bekana and T. Kassa, 2005. Reproductive disorders of crossbred dairy cows in the central highlands of Ethiopia and their effect on reproductive performance. Tropical Animal Health and Production, 37: 427-441.
7. Chakurkar, E., S. Barbuddhe and R. Sundaram, 2008. Infertility in farm animals: causes and remedies. Technical Bulletin No: 15, ICAR Research Complex for Goa (Indian Council of Agricultural Research), Ela, Old Goa- 403402, Goa, India, pp: 1-14.
8. Adane, H., T. Yisehak and T. Niguse, 2014. Assessment of major reproductive disorders of dairy cattle in urban and per urban area of Hosanna, Southern Ethiopia. Animal and Veterinary Sciences, 2: 135-141.
9. Douthwaite, R. and H. Dobson, 2000. Comparison of different methods of diagnosis of cystic ovarian disease in cattle and an assessment of its treatment with a progesterone releasing intravaginal device. Veterinary Record, 147: 355-359.
10. Ball, P. and A. Peters, 2004. Reproduction in cattle. 3rd Edition, Oxford, UK: Blackwell Pub., pp: 79-190.
11. Peter, A., H. Levine, M. Drost and D. Bergfelt, 2009. "Compilation of Classical and Contemporary Terminology Used to Describe Morphological Aspects of Ovarian Dynamics in Cattle." Theriogenology, 71: 1343-1357.
12. Abalti, A., M. Bekana, M. Woldemeskel and F. Lobago, 2006. Female genital tract abnormalities of Zebu cattle slaughtered at Bahir-Dar Town, Northwestern Ethiopia. Tropical Animal Health and Production, 38: 505-510.
13. Opsomer G., M. Coryn and A. De Kruif, 2004. Postpartum anoestrus In High Yielding Dairy Cows. Flemish Veterinarian Journal, 73: 112-118.
14. Karunakaran, M., S. Das, E. Chakurkar and N. Singh, 2012.Anoestrus and Repeat Breeding in Dairy Cows Causes and Management. Indian Council of Agricultural Research Old Goa - 403 402, Goa, Extension Folder: No-49.
15. Gashaw, A., F. Worku and S. Mulugeta, 2011. Assessment of small holder dairy production system and their reproductive health problems in Jimma town South West Ethiopia, Jimma University College of Agriculture and veterinary medicine, Jimma, Ethiopia. International Journal of Applied Research, 9: 80-86.
16. Darwo, F. and E. Zerbini, 1998. Postpartum reproductive function of F1 cross bred cows under small holder management condition in central high lands of Ethiopia. In: Proceedings of the twelfth proceedings of the Ethiopian Veterinary Association, pp: 60-74.
17. Befekadu, U., 2007. A field investigation of delayed resumption of postpartum ovarian activity and prolonged postpartum anoestrous in cross bred dairy cows in Debre Zeit dairy herds. MSc Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
18. Bitew, M. and S. Prasad, 2011. Study on Major Reproductive Health Problems in Indigenous and Cross Breed Cows in and around Bedelle, South West Ethiopia. Journal of Animal and Veterinary Advances, 10: 723-727.
19. Yoseph, S. , 1999. Fertility status of cross breed dairy cows under different production systems in Holleta. MSc thesis, Central High Lands of Ethiopia, Debre Zeit, Ethiopia.
20. Tekilye, B., O. Kasaye and A. Tsion, 1991. Reproductive problems in cross breed cattle in central Ethiopia. Animal Reproduction Science, 26: 41-49.
21. Kapitano, B., 1990. Major constraints of reproduction in small-scale dairy farm around Addis Ababa. DVM thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
22. Zewdu, H., 1992. Studies on postpartum uterine infection in Zebu and Zebu crosses and the incidence rate of reproductive disease in Debre zeit, ILCA herd. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
23. Ebrahim, O., 2003. Study on major reproductive health problem of small holder dairy farms in and around Kombolcha. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
24. Oumermohammed, E., 2003. Study on major reproductive health problems of smallholder dairy farms in and around Kombolcha. DVM thesis: Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
25. Tigre, W., 2004. Major clinical reproductive health problems of dairy cows in and around Holleta. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.

26. Amene, F., 2006. Studies on reproductive performance and major reproductive health problems of HF cows at Alage dairy farm. MSc Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
27. Emebet, M. and M. Zeleke, 2008. Characteristics and constraints of crossbred dairy cattle production in lowland areas of Eastern Ethiopia. Livestock Research for Rural Development, 20: (http://www.lrrd.org/lrrd20/4/mure20057.htm). Accessed on April 5, 2016.
28. Berihu, H. and G. Abebaw, 2009. Major Reproductive Health Problems of Dairy Cows in and around Bako, West Ethiopia. Ethiopian Journal of Animal Production, 9: 89-98.
29. Gebrekidan, B., T. Yilma and F. Solmon, 2009. Major causes of slaughter of female cattle in Addis Ababa Abattoir enterprise, Ethiopia. Indian Journal of Animal Research, 43: 271-274.
30. Gizaw, Y., M. Bekana and T. Abayneh, 2011. Major reproductive health problem in small holder dairy production in and around Nazareth Town, Central Ethiopia, Addis Ababa University, Faculty of Veterinary Medicine, DVM thesis, Debre Zeit Ethiopia.
31. Hadush, A., A. Abdella and F. Regassa, 2013. The Major prepartum and postpartum reproductive problems of dairy cattle in Central Ethiopia. Veterinary Medicine and Animal Health, 5: 118-123.
32. Benti, A. and W. Zewdie, 2014. Major reproductive health problems of indigenous Borena cows in Ethiopia. Journal of Advanced Veterinary and Animal Research, 1: 182-188.
33. Mekonnin, A., C. Harlow, G. Gidey, D. Tadesse, G. Desta, T. Gugssa and S. Riley, 2015. 'Assessment of Reproductive Performance and Problems in Crossbred (Holstein Friesian Zebu) Dairy Cattle in and Around Mekelle, Tigray, Ethiopia.' Animal and Veterinary Sciences, 3: 94-101.
34. Parkinson, T., 2001. Infertility. In: D. Noakes, T. Parkinson and G. England, (Eds) Arthur's Veterinary Reproduction and Obstetrics. 8th Edition, Saunders Company, USA, pp: 463-464.
35. Haile, A., T. Kassa, M. Mihret and Y. Asfaw, 2010. Major reproductive disorders in cross breed dairy cow under smallholding in Addis Ababa milk shed. World Journal of Agriculture Sciences, 6: 412-418.
36. Mekonnen, D., 2000. Study on major infertility problems of crossbred dairy herds in Ada'a district of central Ethiopia. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
37. Esheti, G. and N. Moges, 2014. Major Reproductive Health Disorders in Cross Breed Dairy Cows in Ada'a District, East Shoa, Ethiopia. Global Veterinaria, 13: 444-449.
38. Arthur, G., D. Noakes, H. Pearson and T. Parkinson, 1996. Veterinary reproduction and obstetries. Theriogenology, 4th Edition, Great Britain, Baillier Tindal, pp: 495-498.
39. Micheal, K., 2003. Major clinical reproductive problem of small holder dairy cows in and around Hawassa. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre Zeit, Ethiopia.
40. Takele, A., Y. Gizaw and M. Bekana, 2005. Major reproductive health problems in small holder dairy production in and around Nazareth town, Central Ethiopia. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
41. Gizaw, M., M. Bekana and T. Abayneh, 2007. Major reproductive health problems in smallholder dairy production in and around Nazareth town, Central Ethiopia. Veterinary Online, International Journal of Veterinary Sciences and Medicine, (http://www.fourmilab.ch/rpkp/experiments/analysis/chiCalc.html, ChiSquare Calculator).
42. Dawite, T. and S. Ahmed, 2013. Reproductive health problems of cows under different management systems in kombolcha, North east Ethiopia, Ethiopia. Advanced in Biological Research, 7: 104-108.
43. Meijering, A., 1984. Dystocia and stillbirth in cattle-Review of causes, relations and implications. Livestock Production Science, 11: 143-177.
44. Carnier, P., A. Albera, R. Dal Zotto, A.F. Groen, M. Bona and G. Bittante, 2000. Genetic parameters for direct and maternal calving ability over parities in Piedmontese cattle. Journal of Animal Science, 78: 2532-2539.
45. Srinivas, M., M. Sreenu, N. Rani, K. Naidu and V. Prasad, 2007. Studies on dystocia in graded Murrah buffaloes: A retrospective study. Buffalo Bulletin, 26: 40-45.
46. Meyer, C., P. Berger, K. Koehler, J. Thompson and C. Sattler, 2001. Phenotypic trends in incidence of stillbirth for Holsteins in the United States. Journal of Dairy Science, 84: 515-523.

47. Getenet, A., M. Berhanu and S. Desie, 2014. Major postpartum problems of dairy cows managed in small and medium scale production systems in Wolaita Sodo, Ethiopia. African Journal of Agricultural Research, 9: 2775-2780.
48. Melkamu, T., 1999. Studies on major post partum reproductive problems in Holleta Research station and small holders dairy cattle. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
49. Tilahun, Z., K. Girma, G. Firmaye and F. Lidiya, 2015. Retrospective Study (2010-2014) of Disease Conditions among Reproductive System of Ruminants at Guto Gida Veterinary Clinic, East Wollega Zone, Ethiopia. Nature and Science, pp: 13.
50. Gebremariam, T., 1996. Survey on major prepartum and post partum reproductive problems of dairy cattle in Mekelle and its Environs. DVM Thesis, Addis Ababa University, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
51. Kassahun, M., 2003. Major clinical reproductive problems of smallholder dairy cows in and around Awassa. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
52. Mamo, T., 2004. Study on major postpartum reproductive problems of smallholder dairy cows in and around Debre Zeit. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
53. Demissu, H., B. Fekadu and D. Gemeda, 2013. Early Growth and Reproductive Performances of Horro Cattle and their F1 Jersey Crosses in and around Horro-Guduru Livestock Production and Research Center, Ethiopia. Science, Technology and Arts Research Journal, 2: 134-141.
54. Hovingh, E., 2009. Abortions in dairy cattle: Common causes of abortions. Virginia Coop: Virginia Polytechnic Institute and State University, Blacksburg, Ext. Publ., 404-288.
55. Peter, A., 2000. Abortions in Dairy Cows: New Insights and Economic Impact. Advances in Dairy Technology, 12: 234-235.
56. De Vries, L., 2006. Economic value of pregnancy in dairy cattle. Journal of Dairy Science, 89: 3876-3885.
57. Parthiban, S., S. Malmarugan, M. Murugan, S. Johnson, J. Rajeswar and P. Pothiappa, 2015. Review on Emerging and Reemerging Microbial Causes in Bovine Abortion. International Journal of Nutrition and Food Sciences, 4: 1-6.
58. Berisha, K., 1990. Major constraints of reproduction in small scale dairy farms around Addis Ababa. DVM Thesis, Faculty of Veterinary Medicine, Debre-Zeit, Ethiopia.
59. Bekele, T., O. Kasali and T. Alemu, 1991. Reproductive problems in cross breed cattle in Ethiopia. Animal Reproduction Science, 26: 41-49.
60. Shiferaw, Y., 1999. Fertility status of dairy cows under different production systems in Holetta central Highland of Ethiopia. MSc Thesis, Addis Ababa University and Freie Universitat Berlin, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia.
61. Robert, O.G., 2014. The Merck Veterinary Manual, Vaginal and cervical prolapse. Accessed on March 27, 2016.
62. Kidusan, K., 2009. Study on major reproductive disorders of dairy cattle in and around Wukro, DVM Thesis, College of Veterinary Medicine, Mekelle University, Tigray, Northern Ethiopia.
63. Swiefy, A., 2003. Effect of retained placenta on postpartum reproduction performance of Friesian cows. Egyptian Journal of Animal Production, 40: 111-121.
64. Chauhun, R.S., 2010. Textbook of Veterinary Pathology, 1st Edition, Ibdc publishers Khushnuma Complex Basement 7, Meerabai Marg, pp: 240.
65. Joosten, I., M. Sanders and E. Hensen, 1991. "Involvement of major histocompatibility complex class I compatibility between dam and calf in the aetiology of bovine retained placenta." Animal Genetics, 22: 455-463.
66. Tekleye, B., O. Kasali and T. Gashaw, 1992. Reproductive problems in indigenous cattle of the Ministry of Agriculture-farms in central Ethiopia. Tropical Agriculture (Trinidad), 69: 247-249.
67. Noakes, D., T. Perkinson and G. England, 2001. Post Parturient Prolapse of the Uterus. Arthur's Veterinary Reproduction and Obstetrics; Saunders, pp: 333-338.
68. Jana, D. and M. Ghosh, 2004. Management of prepartum cervical prolapse in indigenous she buffalo-A case report. Intas Polivet, 5: 147-148.
69. Silva, E., M. Gaivao, S. Leitao, B. Jost, C. Carneiro, C. Vilela, L. Lopes da Costa and L.Mateus, 2008.Genomic characterization of Arcanobacterium pyogenes isolates recovered from the uterus of dairy cows with normal puerperium or clinical metritis. Veterinary Microbiology, 132: 111-118.

70. De Bois, C., 1982. In Factors Influencing Fertility in the Post-Partum Cow (eds H. Karg & E. Schallenberger), Martinus Nijhoff, The Hague, pp: 479.
71. LeBlanc, S., T. Duffield, K. Leslie, K. Bateman, G. Keefe, J. Walton and W. Johnson, 2002. Journal of Dairy Science, 85: 2223-2236.
72. Frazier, K., C. Baldwin, M. Pence, J. West, J. Bernard, A. Liggett, D. Miller and M. Hines, 2002. Journal of Veterinary Diagnostic Investigation, 14: 457-462.