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Effects of Major Reproductive Disorders on Dairy Production and Productivity of Dairy Cattle

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Abstract

The primary focus of this review is on significant reproductive issues in dairy cows. The frequency of reproductive problems in dairy and beef cows has a substantial impact on the productivity of dairy cows. In general, the interaction of genetic, managerial, and environmental factors affects reproduction efficiency. In addition, diseases frequently reduce the productivity of dairy cows by lowering milk production, reducing reproductive efficiency, and shortening the estimated duration of productive life. Major issues with dairy cows' reproductive disorders were found in this review. Common issues impeding dairy cattle productivity and production include anestrus, dystocia, repeated breeding, abortion, retained fetal membranes, uterine prolapse, vaginal prolapse, and uterine infections. For these reasons, rather than concentrating on risk factor avoidance and control, dairy managers and animal owners should ensure adequate management. Reproductive issues can be reduced by better postpartum care, which includes adequate nutrition, cleanliness, good hygiene, precise heat detection, and timely AI service.

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Dairy Cows, Reproductive Disorders, Reproductive Efficiency.

Introduction

The intricate process of reproduction is how people create their progeny in order to continue existing. According to Ibrahim and Seid (2017), it is a critical component in determining the productivity of cattle production. It is a crucial factor to take into account when analyzing the economics of producing livestock, especially cattle.

Only by increasing the dairy cows' reproductive efficiency was this goal accomplished. The ability to mate, conceive and nurture the embryo, deliver the viable offspring at the conclusion of a normal gestation period, have functional ovaries, accurately display estrous behavior, resume the estrous cycle, and restore uterine function are all necessary for successful reproduction (Dabale *et al.,* 2020). A lucrative dairy farm depends heavily on reproductive efficiency, which is a vital component of a successful dairy enterprise. Animal performance is determined by both extrinsic (nutrition, management, health, and environment) and intrinsic (genetic merit) elements. Controlling the time between calvings is necessary for optimal reproductive efficiency.

Among the crucial requirements for successful dairy farming are the number of services per conception (NSC), calving interval (CI), and days open (DO) (Abera, 2017; Abdisa, 2018; Abuna, 2018; Borakhatariya *et al.,* 2018).

One cow must give birth to one calf annually in the dairy industry. However, due to a variety of variables that interfere with dairy cows' ability to reproduce normally and function normally, this goal is not always achieved (Weldeyohanes and Fesseha, 2020). The management systems (such as husbandry techniques, breeding strategies, estrus detection, handling of semen, and transition cow management) and animal factors (genetic, age, body condition), nutrition (year-round availability of green fodder), and environmental conditions (such as location, calving season, and nursing status) under which cattle are maintained can all have a significant impact on the reproductive efficiency of dairy cows (Abuna *et al.*, 2018). A variety of issues can impact reproductive circumstances in dairy cows, including the expression of estrus, the development, transportation, and fertilization of eggs, as well as the transfer, implantation, and survival of the conceptus (Agarwal *et al.*, 2005; Ahmed, 2009; Akkoyunlu *et al.*, 2014; Mitiku *et al.*, 2018).

Infertility is a common problem in dairy herds. While a calving interval of 12 to 13 months is generally thought to be economically optimal, it can be challenging to achieve due to infertility, which is hampered by reproductive disorders such as dystocia, retained placenta, prolapses, repeated breeding, anestrus, and uterine diseases. According to Lobato *et al.*, (2006), the economic losses resulting from reproductive health disorders include reduced reproductive rate, longer interconception and calving intervals, slower uterine involution, high medication costs, decreased milk production, and early depreciation of potentially useful cows (Arthur *et al.*, 1982).

Reliable information about the reproductive performance of dairy cows at subsistence dairy farms in the tropics is scarce, despite the fact that major reproductive issues account for a large portion of the industry's high economic loss. Thus, gathering, compiling, and disseminating data on the most common reproductive diseases in dairy cattle was the goal of this review.

Major Reproductive Disorders in Dairy Cattle

Anestrus

Anestrus is a functional loss of the reproductive cycle that is defined by the absence of overt indications of estrus, which might occur because the hormone is not expressed or is not detected. Regardless of cycling, a dairy cow is diagnosed with Post-Partum Anestrus (PPA) if she does not demonstrate estrus within 60 days of giving birth. Anestrus is seen in adult animals during pregnancy, lactation, and the early postpartum period in heifers that have reached puberty (Kumar *et al.*, 2014). Although there are several contributing factors, its occurrence indicates poor nutrition, stress in the surroundings, uterine disease, and inappropriate management techniques (Yavas and Walton, 2000; Atashi *et al.*, 2012).

Anestrus due to physiological factors

Prepubertal anestrus

Prepubertal animals exhibit follicular waves that resemble those of adults, but in response to FSH secretion, follicles only expand until they reach the theca interna stage, at which point they regress. These heifers stay in anestrus prior to the commencement of puberty. Prepubertal anestrus has several consequences, such as low follicle growth due to low luteinizing hormone pulse frequency, opioids' suppression of luteinizing hormone secretion, and a high threshold for the positive feedback effect of estradiol on LH surge (Berglund *et al.*, 2003; Noakes *et al.*, 2009).

Gestational anestrus

Anestrus is caused by a decrease in the frequency of the LH pulse and a negative feedback impact on GnRH release from the hypothalamus caused by an increase in progesterone during pregnancy. But occasionally, during the first four months of pregnancy a condition known as gestational estrus in cattle and buffaloes will exhibit signs of estrus. A small number of studies conducted in India have reported that the incidence of gestational estrus in cattle ranges from 3.33 to 20.3% (Kaikini and Fasihuddin, 1984). While some cows may only display gestational heat once during pregnancy, a small percentage of animals may display heat twice or three times in a single gestation (Curr *et al.*, 2014; Borakhatariya *et al.*, 2018).

Postpartum anestrus

Postpartum anestrus is the term for the varying but brief anestrus that all females experience after giving birth. Under comparable management conditions, cows typically have postpartum anestrus for a shorter duration than buffalo, most likely as a result of reduced LH secretion in the early postpartum phase (Perera, 2011). In 15–45 days after giving birth, the majority of dairy cows begin their ovulatory estrus cycle again (Forde *et al.*, 2011). It is not possible to avoid the physiological postpartum anestrus, which is helpful in allowing uterine involution to occur before the first postpartum anestrus (Cheong *et al.,* 2011; Couto *et al.,* 2013).

Anestrus due to Congenital factors

Freemartins

It is an aberrant intersexual form found in herds of cattle of a certain breed. When the chorioallantois circulations of twin male and female fetuses' fuse, leukocytes exchange and the female twin becomes masculinized, resulting in a male or female chimera known as a freemartin. According to Esteves *et al.,* (2012), a freemartin female typically exhibits extensive ovarian hypoplasia and almost no tubal genitalia, although her external genitalia appear to be normal or slightly different. When a female calf is born as a twin to a male, it is deemed infertile and needs to be found and recognized sooner to be culled. However, because their co-twin died in the womb, some freemartins that were born as singletons may have identified as typical calves (Esteves *et al.,* 2012).

Ovarian hypoplasia

According to Akkoyunlu *et al.,* (2014), it is an infrequent condition marked by inadequate ovarian development in which the affected ovary or a portion of the ovary is completely devoid of follicles. Ovarian hypoplasia is classified into three kinds based on their morphology: total, partial, and transitional. Ovarian hypoplasia has been linked to a variety of etiologies, including X chromosomal abnormalities, autosomal recessive genes that cause various forms of female gonadal dysgenesis, and autosomal dominant genes (Drillich *et al.,* 2006; Esteves *et al.,* 2012).

Anestrus due to management causes

A cow that exhibits silent or non-detected estrus is unable to be followed by anyone. Circular ovarian activity should be sustained throughout the cow's life after the commencement of adolescence, with the exception of pregnancy and a brief puerperium. The herdsman only recognizes the symptoms of estrus when they happen every 21 days or so. There may be indicators of a failing management system, but they might not be noticed (Arthur *et al.,* 1982). Lopez *et al.,* (2004) state that valid data regarding the duration and severity of estrus are not adequately provided when a cow's owner fails to recognize her symptoms of estrus and fails to characterize them through visual observation in the lack of precise reproductive information (Foldi *et al.,* 2006; Forde *et al.,* 2011; Gilbert, 2016). Sub-estrus: Known also as silent heat, this condition occurs when a cow has regular cyclic ovarian activity but does not display the typical behavioral symptoms. It is observed in many cows. The first and second batches of postpartum ovulations are genuinely "silent heat" because they often occur without behavioral indicators of estrus. It is doubtful that true silent heats will occur after the second estrus. Ovulation in the absence of estrus is more likely to be the consequence of inadequate detection rather than a failure of observation because estrus behavior lasts for a brief period of time.

Any factor that affects the endogenous luteolytic hormone's production or release causes prolonged corpus luteum. The condition that most commonly causes corpus luteum to persist in cows is often the reason for erroneous positive diagnoses; nevertheless, luteolysin production or release is interfered with in the presence of uterine infection and tissue inflammation. According to some authors' findings, there isn't much solid proof that the corpus luteum can persist even in the absence of uterine abnormalities (Niswender *et al.,* 2000; Hanafi, 2011).

Repeated breeder

According to Wodaje and Mekuria (2016), a cow is considered a repeat breeder if it has not given birth despite receiving three or more attempts, has a regular estrus cycle, no vaginal discharge aberration, no palpable reproductive tract abnormality, has given birth at least once, and is younger than ten years old. Several studies have shown that a variety of factors, including endocrine issues, malnutrition, infections of the reproductive tract, inadequate management, any anatomic dysfunction of the genital tract, and host defense mechanisms against semen, lead to sub fertile bulls and repeat breeding syndrome (Asaduzzaman *et al.,* 2016). Dairy cattle are susceptible to multiple risk factors for repeat breeding, two of the most important ones being early embryonic development and fertilization failure (Hossein-Zadeh *et al.,* 2008; Hovingh, 2009).

Fertilization failure

Fertilization failure accounts for about 40% of recurrent breeder cows. Fertilization failure caused by ovarian abnormalities, ovary impairment, abnormal conditions of the uterus and oviducts, endocrine dysfunction, inherited or hereditary ovarian defects, genital tract anomalies, ovarian hypoplasia and gonad less condition, spermatozoa aging and genetic defects, improper handling of semen, and artificial intelligence (Wodaje and Mekuria, 2016; Ibrahim and Seid, 2017).

Early Embryonic Death

Early embryonic death is the term used to describe the death of an organism within the first 15 to 21 days following artificial insemination or natural mating. There are two categories of causation for early fetal mortality: infectious and non-infectious. Non-infectious factors account for about 70% of EED cases. Between 8 and 19 days after breeding, before the critical time of maternal pregnancy awareness, the majority of early embryonic loss occurs. Cytogenetic anomalies of the early embryo, an unfavorable uterine environment caused by hormone imbalances, uterine infections, poor nutrition, environmental stress, and immunological issues can all contribute to embryonic death. Chromosome abnormalities, hormone imbalances, disruptions in the interactions between the mother and fetus, inbreeding, etc. are examples of non-infectious causes. In dairy cows, chromosomal abnormalities account for twenty percent (20%) of all early fetal death (Jamaluddin *et al.*, 1996; Ishii *et al.,* 2010).

The proliferation of certain and nonspecific bacteria, viruses, and protozoa may be the origin of infectious reasons, which make the uterus unsuitable for fetus implantation. Worldwide, three to ten percent of dairy cows are repeat breeders. Pathological conditions, endometritis, vitamin A deficiency, the age of the dam, incorrect issues such dystocia, retained fetal membranes and heat detection, and endocrine dysfunction are the most common causes of re-peat breeding (Kahn *et al.*, 2005; Ahmed, 2009).

Due to its multifaceted etiology, which includes cows, seed quality, and inseminator or insemination technique, an ideal strategy for treating repeat breeding on an individual cow basis frequently stays indefinable (Kaikini and Fasihuddin, 1984; Walsh *et al.,* 2011).

Some related variables, including estrous behavior and some endocrine characteristics, have been studied in contemporary high-yield repeat breeder (RB) cows. Up to 50% of RB cows have been reported to be in extended and/or quiet estrus (Khodakaram-Tafti and Ikede, 2005; Cummins *et al.*, 2012; Kebede *et al.*, 2017).

Abortions

The premature exclusion of a baby between 42 days, which is considered to be the estimated time of attachment, and roughly 260 days of gestation, which is the age at which the fetus can survive outside of the uterus, is known as an abortion. It is the most prevalent issue with dairy cows, which limits the cow's yearly calf production and has a significant impact on the dairy farm's earnings (Peter, 2000). According to Sarder *et al.*, (2010), an abortion can also occur when the fetus is delivered alive or dead before it reaches the stage of viability where it can be seen with the unaided eye. The veterinarian and herd owner face a significant dilemma when it comes to judging abortions. Over an extended period of time, there is a sharp and sudden rise in the number of abortions in herds. When abortions do occur, prompt and decisive intervention is necessary. Factors that may be connected to abortions include breeding dates, parity, production data, and health events (such as illness or immunization) (LeBlanc *et al.,* 2002; Zwald *et al.,* 2004; Kumar *et al.,* 2014; Kumar and Yasotha, 2015).

Infectious (bacteria, viruses, protozoa, and fungus) and non-infectious (toxic agents, heat stress, and genetic abnormalities) agents were among the many reasons of abortion that Hovingh (2009) highlighted. The most frequently recognized cause is infectious pathogens. When Jamaluddin *et al.*, (1996) looked into 595 abortion submissions in California, they discovered that 37.1% of the cases were related to infectious agents, 5.5% to non-infectious agents, and 57.3% to unidentified reasons. Of the 37.1% caused by infectious agents, 18.0% were attributed to bacteria, 14.6% to protozoa, 3.2% to viruses, and 1.3% to fungi. According to Khodakaram-Tafti & Ikede (2005), the three most prevalent infectious agents in Canada were viral (6%), fungus (7%), and bacteria (24%) (Lopez *et al.,* 2004; Lobago *et al.,* 2006).

Dystocia

The inability of the cow to remove newborns from the uterus through the birth canal is known as dystocia. Problems with the mother or fetus induce this condition (Mekonnen and Moges, 2016). Dystocia can have a significant financial impact on producers due to the time, energy, and money invested in ensuring that a cow conceives through artificial insemination (AI) or natural service. Other factors that may contribute to this impact include increased veterinary costs, decreased productivity, decreased fertility, and, in extreme situations, damage to or death of the dam (Bicalho *et al.*, 2010). According to recent studies, dystocia may potentially have long-term repercussions on newborn calves as well, decreasing their chances of surviving to adulthood and producing milk later on (Meyer *et al.*, 2001; Atashi *et al.*, 2012; Mee *et al.*, 2014; Mekonnen and Moges, 2016; Megahed, 2018; Mee, 2020).

Dystocia of maternal origin

One of the two causes of dystocia, which are induced by maternal factors and result in birth canal constriction, is a lack of expulsive forces. According to Noakes *et al.*, (2001), the three most significant restricting forms are insufficient dilation of the cervix, pelvic inadequacies, and uterine torsion. The most frequent cause of dystocia of maternal origin is failure of cervical dilatation and uterine torsion. Long-term progesterone administration during pregnancy is linked to failure of cervical dilatation (Mekonnen and Moges, 2016). Sometimes, if females are bred for the first time when they attain at least 65% of adult weight and height, dystocia due to the small size of the dam is observed. Space-occupying lesions or tumors can cause the birth canal to narrow. In older animals or animals with lengthy pregnancies, uterine inertia, resulting from weak or absent uterine contractions, is observed occasionally. Secondary uterine inertia may also be caused by low calcium levels (Niswender *et al.*, 2000; Noakes *et al.*, 2009; Megahed, 2018; Mitiku, 2018).

Dystocia of Fetal Origin

Feto-pelvic disproportion—the excessive size of the fetus in relation to the mother pelvis—and fetal monsters, fetal illnesses, and fetal maldisposition—the abnormalities of the fetus—are the two categories of fetal sources of dystocia in cattle. Additionally, the aberrant 3Ps (P1presentation, P2-position, and P3= posture) can be broadly classified as the fetal genesis of dystocia (Kebede *et al.*, 2017; Noakes *et al.*, 2018). Present refers to the relationship between the fetus's long axis and the mother's birth canal; position designates the area of the birth canal to which the fetal vertebral column is applied; and posture describes how the fetus's movable appendages are positioned, including how the limbs and neck are extended or flexed. Fetal dystocia is therefore examined in this review based on fetal anomalies and enlargement (Purohit *et al.*, 2011). With beef cattle, dystocia due to an enlarged calf with a normal anterior longitudinal presentation occurs frequently. A normal delivery is performed longitudinally, in the anterior presentation, dorsal sacral position, and with bilateral foreleg extension (Noakes *et al.*, 2001; Patel and Parmar, 2016; Noakes *et al.*, 2018; Parikh *et al.*, 2018).

Peri-still birth

Perinatal mortality, which encompasses both stillbirths and early neonatal mortality, is the death of the fetus or perinate before, during, or within 48 hours of calving at full gestation (>260 days) (Mee *et al.*, 2014), Although "stillbirth" is frequently used interchangeably with "perinatal mortality," especially by farmers and their veterinarians, it is more accurately described as the death of a fetus that occurs prior to or during full-term calving.

This terminological imprecision might be avoided by using the original portmanteau "peri-stillbirth," which includes both stillbirth and perinatal death. According to Mee (2020), these gestational and perinate age limitations are arbitrary and differ between countries (Peter, 2000; Petera, 2011). Studies conducted in Iran indicate that the overall rate of calf stillbirth in Holstein cows was 4.9%, with herd-specific variations ranging from 2.9 to 9.8% (Hossein-Zadeh *et al.*, 2008).

Dairy cows appear to have given birth to more stillborn babies in recent years (Hossein-Zadeh *et al.*, 2008). According to the USA, the prevalence of stillbirths has increased over the past 20 years, rising from roughly 6.3% to 10.3% (Ber-glund *et al.*, 2003). According to Meyer *et al.*, (2001), the percentage of stillborn calves in multiparous cows grew from 5.0% to 6.6% between 1985 and 1996, whereas the percentage in primiparous cows climbed from 9.5% to 13.2% in 1985. The overall frequency of stillbirths in Danish Holsteins was reported by Hansen *et al.*, (2004).

Retained fetal membrane

Retained placenta was defined by several writers as follows. Drillich & Associates (2006) Retention of fetal membranes is characterized as the inability or delay in fetal membrane separation/expulsion. Retained placenta is described as the ability to maintain fetal membranes for six to twenty-four hours after parturition (Swiefy, 2003). When the fetal membranes do not eject within 12 to 24 hours following the fetus's expulsion, the situation is known as retention of placenta in the cow (Takagi *et al.*, 2002). Retained placenta is defined as the placenta that does not empty itself after 12 hours of calving (Sheldon *et al.*, 2006; Sarder *et al.*, 2010; Yusuf, 2013; Sheldon and Owens, 2018; Shah, 2019).

It is among the most prevalent illnesses following childbirth. For the fetus to receive nutrients and oxygen from the mother during pregnancy, a fetal membrane is a crucial organ (Hanafi, 2011). It normally falls out within 8 hours of parturition, but if it remains after that, it is referred to as delayed removal; if it remains after 24 hours, it is referred to as retention of placenta (ROP).

By enabling bacteria to proliferate inside the uterus and causing inflammation, fever, weight loss, decreased milk output, longer calving intervals, and maybe an open cow the following year, such retention causes a lot of issues. If the infection is severe enough, the animal may even die.

More postpartum illnesses, less milk supply, poorer reproductive outcomes, and higher rates of culling are linked to being hospitalized for longer than 12 hours following childbirth (Abdisa, 2018). Its incidence ranges from 4.0 to 16.1%, with problematic herds having a substantially higher incidence. Specific infections like Brucella, Leptospira, Campylobacter, listeriosis, infectious bovine rhinotracheitis (IBR), and others, as well as nonspecific infections caused by a variety of bacteria and viruses that can arise during pregnancy or during calving, twine birth, and nutritional deficiencies such as those involving selenium, vitamin E, and vitamin A, have been linked to an increased prevalence of retained placenta (Simpson, 1999).

Uterine prolapse

According to Kumar *et al.*, (2014), prolapse of the uterus is a non-hereditary abnormal consequence of the uterus that is typically manifested as the uterus's expulsion through the vulva to the outside of the body, usually happening immediately after parturition and sometimes up to several hours later. It exits the uterus through the vulva, usually soon after parturition, with or without the vagina and cervix attached, and it hangs out with the innermost layer. Prolapse may result from uterine inertia, which is when the uterus stops contracting due to metabolic issues, intra-abdominal fat or rumen distension that is excessively imposed upon the relaxation and softening of the pelvic girdle, or from increased intra-abdominal pressure associated with the larger size of the pregnant uterus (i.e., milk fever). The most prevalent obstetrical issue is uterine prolapse, which affects cattle's ability to reproduce and be productive by lowering the post-partum return to estrus, conception rate, and calving interval in dairy cattle (Simpson, 1999; Swiefty, 2003; Kumar and Yasotha, 2015).

According to Ward and Powell (2018), prolapse is the partial or total turning inside out of the organ, where the inside emerges through the vulva's lips and hangs down, occasionally reaching the hocks. It's regarded as an urgent medical situation. Animal species are at risk of death from this illness, especially cows. The cow could go into shock or lose too much blood if she is not treated right away. The cow may continue to reproduce normally if the uterine prolapse is properly corrected. Nevertheless, a recurrent infection in the uterus may cause the cow to rebreed slowly or not at all (Turk *et al.*, 2011; Ward and Powell, 2018).

Cervico-Vaginal prolapse

It is described as the cervix occasionally passing via the vulva, but mostly the vagina. Occasionally, the entire cervix or vagina prolapses through the vulva. All domestic animal species exhibit it; however, cows are the most common. It describes a situation where a portion of the vaginal wall extends past the vulva. It usually happens in the middle to late stages of pregnancy, occasionally even after delivery. The appearance of vaginal prolapse, which is more prevalent than uterine prolapse, typically resembles a pink tissue bulge the size of a soccer ball or a huge grapefruit. The precipitation of genital organ prolapses suggested a number of etiologies, but the most likely explanation is placental estrogen during the second half of gestation in cattle, which causes the pelvic ligament, vulva, and vulval sphincter muscle to relax (Parikh *et al.,* 2018). However, hereditary predisposition may not be under-mined. It happens as a result of elevated abdominal cavity pressure in the later stages of pregnancy, much like uterine prolapse (Kahn *et al.,* 2005). Cows with Bos indicus heritage, older cows, and cows pregnant with twins are more likely to experience vaginal prolapse. Because that sort of feed may contain phytoestrogens, cows confined to grazing clover pastures may also be more susceptible to vaginal prolapse (Walsh *et al.,* 2011; Ward and Powell, 2018; Parikh *et al.,* 2018).

Uterine diseases

Metritis

Metritis and endometritis are the two primary clinical disorders that arise after childbirth. Within ten days of giving birth, a woman develops metritis, which is characterized by an enlarged uterus that produces an off-white, purulent fluid that ranges from a watery reddish-brown discharge to a viscous discharge that frequently smells foul (Sheldon and Owens, 2018). The animal's health indicators can be used to classify the degree of metritis, ranging from a minor illness to toxemia. In a study of the records from 97,318 cows in the USA, the lactation incidence of metritis, including retained placenta, was 21%. The incidence of metritis varies according on breed, country, and herd (Zwald *et al.*, 2004). Within 21 days following calving, a rectal temperature higher than 39.5°C is a significant usual indicator of metritis. Puerperal metritis is predisposed to by retained placenta, fetal maceration, and dystocia (Yavas and Walton, 2000; Földi *et al.*, 2006; Wodaje and Mekuria, 2016).

Endometritis

According to Turk *et al.*, (2011), clinical endometritis is characterized by inflammation of the uterine mucous membrane and a purulent discharge that is visible in the vagina three weeks after parturition or a mucopurulent discharge that is visible in the vagina 26 days after parturition. Endometritis remains a prominent factor in low fertility and delayed conceptions after parturition (Couto *et al.*, 2013). Depending on the breed, nation, and herd, the incidence of clinical endo- metritis varies between 10 and 20% globally; a typical study found that 16.9% of 1,865 cows in Canada had the disease (LeBlanc *et al.*, 2002). The risk factors for uterine infection that are most frequently linked to endometrial trauma include dystocia, retained placenta, twins, male and beef sire calves, stillbirth, and cesarean section surgery (Potter *et al.*, 2010; Mekonnen and Moges, 2016; Megahed, 2018). Endometritis has several different and complex causes. The immune system of the dairy cow is suppressed during the final two weeks of pregnancy and the first three weeks following childbirth. The uterus becomes contaminated with bacteria just after calving, and this normally lasts for two to three weeks.

This is a normal and expected phenomenon as the natural barriers and bacterial defenses are momentarily compromised due to the cervical dilation and the vestibule and vaginal relaxation. Endometritis can be predisposed by retention of the fetal membrane, injury to the reproductive tract from difficult calving, excessive force used to aid in calving, injury during breeding, uterine treatment, contamination of the reproductive tract during calving, and over-conditioning, which can expose cows to a variety of health issues at the time of parturition (Gilbert, 2016). Clinical and subclinical endometritis has a detrimental impact on the global dairy industry's performance; financial losses are associated with ovarian activity resumption delays, higher costs per conception, lower milk yields, and higher treatment expenses (Niswender *et al.*, 2000; Noakes *et al.*, 2001; Cheong *et al.*, 2011; Perera, 2011; Patel and Parmar, 2016; Parish *et al.*, 2018; Mitiku, 2018; Noakes *et al.*, 2018).

Pyometra

According to Sheldon *et al.*, (2008), Pyometra is defined by the buildup of purulent or mucopurulent fabric in the uterine lumen and uterine distension when there is a closed cervix and an active corpus luteum. With a 2% incidence rate, postpartum Pyometra is an unusual condition that is believed to be brought on by the development of harmful bacteria in the uterine lumen following the ovary's first corpus luteum production. The cervix is functionally closed, but the lumen is not always fully closed, and pus can occasionally leak into the vaginal lumen from the cervix. Pyometra is a condition that appears on ultrasonography as mixed echo density fluid in the uterine lumen, uterine distension, and an ovarian corpus luteum (Sheldon *et al.*, 2006). Increased levels of luteotropic prostaglandin PGE2, which are linked to endometrial bacterial infections, may be the cause of luteal phase delay. If corpus luteum forms during uterine infection and ovulation takes place too early in the postpartum phase, Pyometra may result (Sheldon *et al.*, 2008).

Conclusion

In dairy cattle, maintaining reproductive health and spotting possible issues in the areas of reproduction and production are crucial. As the most significant factor influencing a cow's ability to live a productive life, immune system health also plays a significant role in reducing the likelihood of health issues in cattle. Dairy operations use artificial insemination and genetic selection to optimize milk yield per cow. However, because multiple factors impede reproduction, this objective is not entirely met.

It is now believed that anestrous, abortion, dystocia, recurrent breeding, RFM, and uterine disorders are the main factors influencing dairy cows' ability to reproduce. In order to reduce the incidence of reproductive issues and the resulting financial losses in dairy cattle, efforts should be made to raise awareness and enhance post-partum management. This includes enhanced nutrition, cleanliness, good hygiene, precise heat detection, AI services, and health monitoring.

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