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REVIEW ON OVARIAN CYSTS IN DAIRY CATTLE, ITS TREATMENT AND PREVENTION

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ABSTRAC

The purpose of this paper was to examine ovarian cysts in dairy cattle, as well as their treatment and prevention options. Cysts are simply fluid-filled sacs surrounded by membranes, similar to grapes, and are most commonly seen in dairy cows in the first two months after calving. The development of large, persistent ovulatory follicles in the ovaries and the failure of a mature follicle to ovulate at the right period throughout the estrous cycle describe Ovarian Cysts (OC). The most common types of ovarian cysts in dairy cows are follicular cysts, luteinized cysts, and cystic corpora lutea. Ovarian cysts are usually connected with heredity, high milk production, age, lactation period, body condition score, seasonality, and phytoestrogens, yet the specific causes are unknown. Ovarian Cysts (OC) in dairy cows are diagnosed using a combination of history and clinical signs, transrectal palpation, ultrasonography, and plasma or milk progesterone assays. The main treatments for Cystic Ovarian Disease in dairy cows are Gonadotrophin Releasing Hormone (GnRH), Human Chorionic Gonadotrophin (HCG), and Prostaglandin F2 (PGF2). The economic losses of ovarian cysts are produced by an increase in the number of days open, an increase in the culling rate due to infertility, high treatment expenses, and a longer calving interval. Cystic ovarian disease is prevented through careful genetic selection, the elimination of bulls whose sire daughters have had cystic ovarian

disease, and appropriate diet.

Keywords:- Ovarian Cysts, Dairy Cow, Prevention and Treatment

Introduction

Ovarian cysts (OC) are thought to be one of the most common causes of cattle reproductive failure. It is incurable in the dairy business because it results in considerable financial losses due to the prolongation of the day open time, increased treatment costs, and the possibility of removing cows from the herd. Also increases the time between calving and conception, as well as the culling rate (Grohn *et al*., 1997). The presence of big, persistent ovulatory follicles in the ovaries characterizes it (Wiltbank *et al*., 2002). It's also defined by a developed follicle failing to ovulate at the proper period throughout the estrous cycle (Ortega *et al*., 2015). The incidence of cystic ovarian disease in dairy farms varies, ranging from 5% to 25%, which is most likely attributable to differing management practices (Peter, 2004).

Heredity, high milk production, age, lactation period, body condition score, seasonality, and phytoestrogens are the most prominent factors linked to illness prevalence. Furthermore, cystic ovarian illness is caused by a retained placenta, milk fever, metritis, and stress (Cattaneo *et al*., 2014).Cows with aberrant postpartum circumstances such as retained fetal membranes, metritis, ketosis, and lameness are 1.4 to 2.9 times more likely to develop cystic ovarian disease than cows that have had a healthy postpartum phase (Brito and Palmer, 2004). Heredity, cow parity, seasonal variance, high milk output, aberrant puerperium, uterine infection, and diet are some of the risk factors.

Palpation alone is insufficient to distinguish follicular cysts from luteal cysts. In anestrous cows, it's impossible to tell the difference between follicular and luteinized cysts without utilizing ultrasonography. Combining transrectal palpation of the genital tract to determine that a corpus luteum is absent and the uterus lacks tone with ultrasonography to confirm that a corpus luteum is absent, to determine the size of follicles that are present, and to check for luteinization can improve the accuracy of diagnosing ovarian cysts and differentiating follicular and luteal cysts (Bartolome *et al*., 2005).

Rather than using a progesterone assay or ultrasonography, the most common method of pregnancy diagnosis is palpation of the reproductive canal. Non-cyclal (real anestrus) cows must be distinguished from cyclic cows that have not been discovered in estrus. The latter is required for the sensible application of medication aimed at synchronizing oestrus and insemination at a specific period (Eddy, 1977and Thatcher *et al*., 1997). Early pregnancy

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detection is also vital in reproductive management so that non-pregnant animals can be re-bred as soon as feasible. Accurate diagnosis is crucial for cystic ovarian degeneration treatment (Dobson & Nanda, 1992).

Gonadotropin-releasing hormone (GnRH), which induces the pituitary to release Luteinizing Hormone (LH) and luteinization of the cyst, is currently the most effective treatment for cattle with ovarian cysts. Later treatment of luteinized cysts with prostaglandins results in the structure's regression (Pushp *et al*., 2016). To that end, research into and review of ovarian cysts in dairy cows, as well as treatment and preventative approaches, has begun and paramount.

Characteristics and Economic Losses of Ovarian Cysts

Ovarian cysts are defined as formations with a diameter of more than 2.5cm that stay on an ovary for longer than 10 days. Cysts are simple fluid-filled sacs surrounded by membranes, much like grapes (Figure 1). In cows, cystic ovarian disease is most common in the first two months after calving. Though there is no clear consensus on what causes ovarian cysts, they are thought to be linked to a variety of factors such as per parturient stress, age, nutritional deficiencies, and genetic susceptibility (Day, 1991). Progesterone, luteinizing hormone, and estradiol-17 concentrations in plasma in cows with cystic follicles remain high even when ovulation is expected (Hatler *et al*., 2003).

Furthermore, the quantity of fatty acids (particularly palmitic and stearic acid) in serum of the cystic cows was higher than the normal estrous cyclic cows. On practically every dairy farm in the world, ovarian cysts diminish reproductive efficiency. Ovarian cysts diminish reproductive efficiency and milk production, resulting in significant financial losses for most dairy farms. The incidence of cystic ovarian disease in dairy farms varies, ranging from 5% to 25%, which is most likely attributable to differing management practices. The research reveals that Cystic ovarian disease (COD) has various causes, making it difficult to understand the disease's origins and design an effective treatment (Ortega *et al*., 2015).

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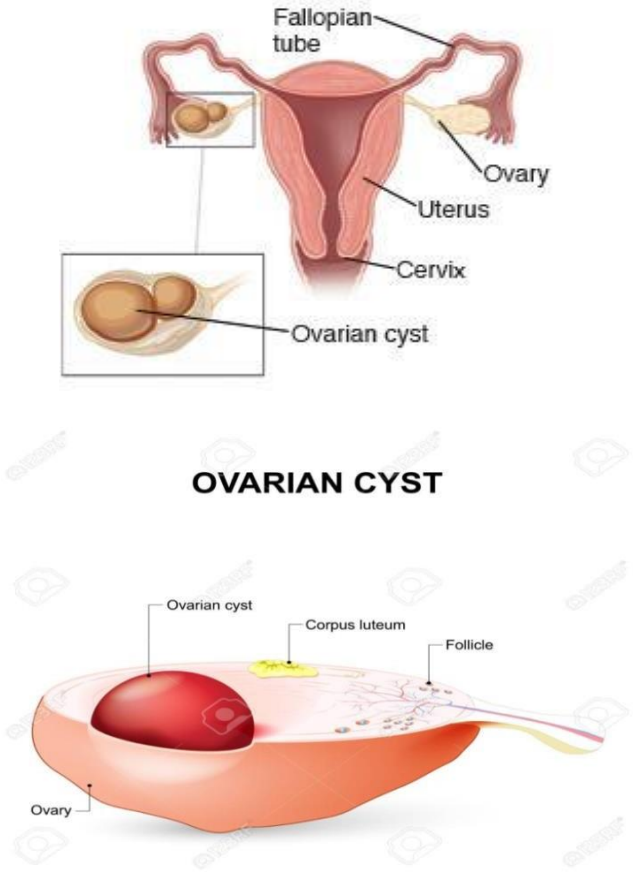

Figure 1: Ovarian Cyst

Furthermore, with a reported prevalence of 6 to 23 percent, cystic ovarian disease is a cause of temporary infertility and one of the most prevalent reproductive illnesses in dairy cows (Butler, 2003). Cystic ovarian illness is linked to a 6 to 11 day delay between calving and first service, as well as a 20 to 30 day delay between calving and pregnancy compared to the norm. It's also been linked to an increased risk of culling. The effects on the cost of feed, average growth of calves, labor, and medical charges account for the majority of the economic loss caused by the rate of ovarian cysts (Gundling *et al*., 2009)

COFs (Cystic Ovarian Follicles) are a common cause of infertility in dairy cows because they prolong the calving interval. The cost of COF treatment and the lengthening of the calving interval result in a financial loss for the dairy farmer. COF is commonly referred to as Cystic Ovarian Disease (COD) in the literature (Fourichon *et al*., 2003).

Types of Ovarian cysts in dairy cows

Ovarian cysts are ovulatory ovarian formations without a corpus luteum that have a chamber larger than 20mm in diameter (follicular or luteal). The wall thickness of follicular and luteal cysts (FC and LC) differs by less than 3 mm in FC and more than 3 mm in LC (Brito *et al*., 204). Follicular cysts, luteal cysts, and cystic corpora lutea are the three forms of ovarian cysts.

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a. Follicular Cysts

The traditional accepted definition of ovarian follicular cysts is "follicular formations of 2.5 cm or larger that survive for a variable period in the absence of a corpus luteum" (Youngquist and Threlfall, 2007) Figure 2. Ovarian Follicular Cysts (OFC) is follicles with a minimum diameter of 20 mm that are present in one or both ovaries in the absence of a corpus luteum and interfere with cycling, according to Vanholder *et al*. (2006). Because of the features of modern intensive systems, such as increased milk output, metabolic condition of high-producing cows, and management approaches (Vanholder *et al*., 2006 and Braw-Tal *et al*., 2006), the clinical characteristics of OFC and associated factors have changed.

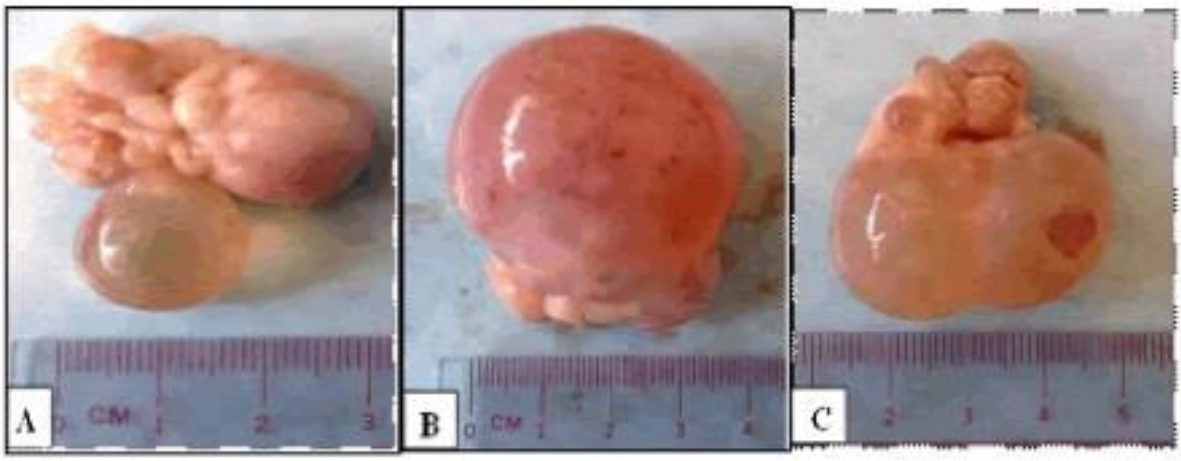

Figure 1: Ovary containing Follicular cyst characterized by large, thin wall contain serous clear follicular fluid (A) single small cyst (B) large cyst 40 mm in diameter (C) double cyst.

b. Luteinized Cysts

Luteal cystic ovary disease is characterized by larger ovaries and one or more cysts with thicker walls than follicular cysts due to a luteal tissue lining (Kahn) (2010). Luteinized cystic follicles, as described by Ball and Peters (2004), are cysts with thicker walls that produce significant quantities of progesterone. They have a smooth and rounded appearance, with a spherical chamber enclosed by fibrous tissue and surrounded by luteinized cells (Schlafer, 2007). Figure 3. When the cells of the follicular cyst (granulosa and theca) become luteinized and begin generating progesterone, the luteal cyst develops (Peter *et al*., 2009). The occurrence of luteal cysts rises with age and is most common in cows that produce a lot of milk.

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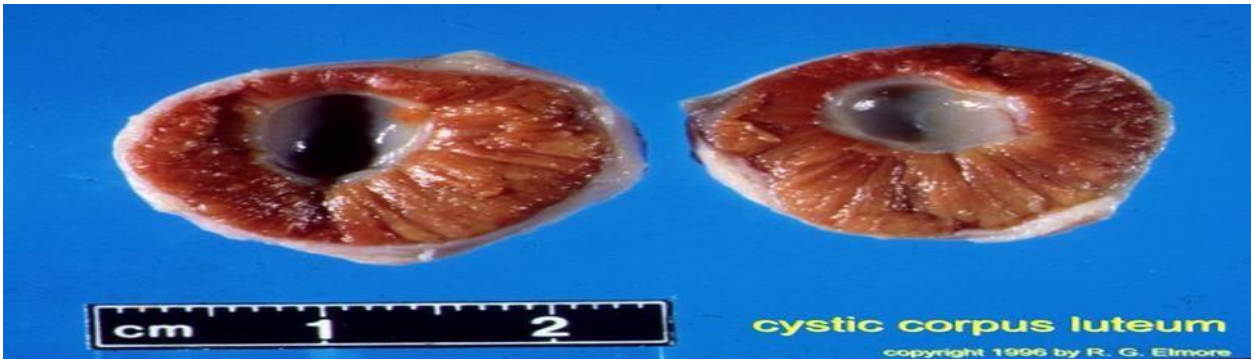
Figure 2: Ovary containing large luteal cyst characterized by thick walled contain serous clear follicular fluid (A) double cyst (B) large cyst 50 mm in diameter (C) 22 ml follicular fluid after aspiration from luteinized cyst.

c. Cystic Corpora Luteal

The diameter of a cystic corpus luteum in a cow is greater than 7 mm Figure 4. The terms for cystic corpus, which is luteal tissue that originates from a corpus hemorrhagicum and contains fluid in a central cavity luteum (CL), are frequently confused with those for luteal cysts, despite the fact that the former is a normally functional structure and the latter is a pathological condition. When follicles become luteinized without ovulation, cystic luteal develops spontaneously (Hamilton *et al.*, 1996).As a result, the term "corpus luteum with a cavity" has been proposed as a replacement for the term "cystic corpus luteum" (Chuang *et al*., 2010).

During diestrus, the prevalence of cystic corpora lutea (CLs) ranges from 25.2 percent to 78.8 percent, and it declines as the estrous cycle progresses. Cystic corpora lutea are considered a typical stage or variety of CL development because they are detected in cows that are normally cycling or pregnant. Due to the presence of fluid from a degenerating blood clot, cystic CL have a soft, mushy core area, as opposed to the uniform, liver-like consistency of a conventional CL's base. Although a diagnosis isn't required because cystic CLs aren't pathogenic and hence don't require treatment, the best time to spot the structure is 5-7 days following estrus. The ovarian structure is nearing the end of the corpus hemmorhagicum at this time.



Cause of Ovarian Cysts

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Ovarian cysts are one of the most common causes of infertility in dairy cows, and their high incidence, increased days to first service, and increased days open are all linked to significant economic loss (Lopez-Diaz, 1996). The incidence of ovarian disease (OD) in dairy farms varies from 2.7 percent to 15.1 percent between 5 and 25%, which is most likely attributable to varied management practices (Cattaneo *et al*., 2014). It is also regarded as high, as the prevalence of this illness has been estimated to be between 10% and 30% in various herds (Vanholder *et al*., 2006; Grado-Ahuir *et al*., 2011). Cows with OC and decreased production throughout the puerperal phase were more likely to recover spontaneously. The milk output of growing cows was much higher.

The specific cause of ovarian cysts is unknown at this time, although it appears that endogenous and/or exogenous stimuli disrupt the hypothalamo-pituitary-gonadal axis, resulting in cyst formation (Amweg *et al*., 2013). Heredity, high milk production, age, lactation period, body condition score, seasonality, and phytoestrogens are the most prominent factors linked to illness prevalence. However, it's been reported that a retained placenta, milk fever, metritis, and stress all play a role in cystic ovarian disease (COD) (Cattaneo *et al*., 2014).Furthermore, cystic ovaries are caused by a combination of inherited factors, milk output, stress, and an imbalanced diet (Crane *et al*., 2006 and Jeengar *et al*., 2014). Genetics, hormonal imbalances, and exogenous factors have all been proposed as factors that predispose cows to develop follicular cysts, and the most widely accepted hypothesis is that Cystic ovarian disease is caused by a neuroendocrine imbalance involving the hypothalamic-hypophyseal-gonadil-axis (Hooijer *et al*., 2001).

Diagnosis of Ovarian Cysts

History and clinical signs, transrectal palpation, ultrasonography, and plasma or milk progesterone assays are all used to diagnose ovarian cysts in cows (Peter, 2004). Ovarian cysts discovered after the puerperium had a negative impact on fertility, but cysts discovered during the puerperium have no effect on reproduction (Gossen and Hoed, 2006).In high-yielding dairy cows, the most likely time of diagnosis is 30-60 days after parturition, but the presence of ovulatory follicles within the initial weeks after calving should not be mistaken for ovarian insufficiency. In practice, an ovarian impairment can be considered if ovulatory follicles are identified no earlier than 7 weeks following calving, when reproductive capabilities are supposed to be restored (Sheldon and Dobson, 2004). Obtaining information about the animal's reproductive history, vaginal inspection, and progesterone testing can improve the accuracy of diagnosis. Ultrasonography has a good sensitivity for detecting follicular and luteal cysts (Hanzen *et al*., 2000).It might be difficult to tell the difference between follicular cysts and luteal cysts because they are similar in size and function. Physical examination, ultrasonography, and plasma progesterone tests are all used to make a good diagnosis: Combining per rectum palpitation of the genital tract to determine that a corpus luteum is absent and the uterus lacks tone; ultrasonography to confirm that a corpus luteum is absent, to determine the size of follicles that are present, and to check for luteinization; and measurement of plasma progesterone concentration to determine the degree

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of luteinization can improve the accuracy of diagnosing ovarian cysts and differentiating follicular (Bartolome *et al*., 2005).

Ovarian cysts are differentiated from shallow anestrus on the basis of the number and size of the follicles, occurrence of follicular waves, body condition score (BCS), and stage of lactation (Bartolome *et al*.,2005). Diagnosis of ovarian cysts itself is easy, but accurate differentiation between follicular and luteal structures is difficult (Hanzen *et al*., 2000).Further examination of the suspected animal's reproductive history and previous treatments for reproductive disorders in combination with ultrosonographic examination can then be used as a basis for diagnosis (Peters *et al*., 2009).

In general, luteal cysts are associated with relatively high concentrations of progesterone in the peripheral circulation while follicular cysts are associated with relatively low concentrations of progesterone. Many researchers have used a plasma Progesterone 4(P4) concentration greater than 1 ng/ml as the minimum P4 concentration for a cyst to be considered luteal. Thus accurate diagnosis of the type of OC requires a combination of diagnostic approaches such as transrectal palpation, transrectal ultrasonography and plasma progesterone profiles (Santos et al., 2000).

Treatment of Cystic Ovarian Disease

a. Gonadotrophin releasing Hormone (GnRH)

Gonadotrophin-releasing hormone (GnRH) is most effective treatment used because it induces the release of luteal hormone (LH) (Roche *et al.*, 1997). Eissa and El-Belely (1995) reported that repeated GnRH treatment at7-day intervals were more effective than a single treatment. In general, after administration of GnRH, within three weeks there is a resumption of the normal oestrus cycle in 60%-95% of treated cows, followed by pregnancy rates of 60% -85% (Mollo *et al*., 2012) GnRH administration along with potassium iodide feeding for dairy cattle is the best treatment option with ovarian cyst (Pushp *et al*., 2016).

b. Human Chorionic Gonadotrophin (HCG)

Human Chorionic Gonadotrophin (HCG) is used because of its high luteinizing hormone (LH) activity (Kasler and Graverick, 1982).The HCG compound has been used successfully for treatment of refractory cysts, which do not respond to GnRH therapy (Peter, 2004).The success of therapy with long-acting gestagens is high because usually 70%-85% of cystic cows recover within two weeks and conceive within three inseminations (Mollo et al., 2012). It was reported that HCG and GnRH have an equal therapeutic effect in cystic dairy cows (De Rensis et al., 2010).

c. Prostaglandin F2 α (PGF2α)

The use of PGF2α is based on its luteolytic effect causing regression of corpus luteum and allows development of dominant follicle on the ovary that result in estrus and ovulation in 72 to 96 hours after its administration. PGF2α is widely used to get rid of from the conditions like luteal cystic ovarian disease, persistent corpus luteum, endometritis, abnormal pregnancy, pyometra, retention of placenta and mummification. It has been now in vogue to

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administer PGF2α or its analogue in early postpartum cows in order to hasten early resumption of cyclic ovarian activity and thereby to increase the reproductive efficiency (Parmar et al., 2016).

Prostaglandin F2a (PGF2 a) is only indicated if cysts are luteinized because it induces regression of luteinized cysts, with oestrus occurring 2 or 3 days after treatment (Kasler and Graverick, 1982).Prostaglandin F2α (PGF2α) or its analogues are used in the treatment of choice for luteal cysts (Hanzen et al.,2000). Moreover, this therapy could be combined in the treatment of follicular cysts with GnRH/hCG to shorten the induced luteal phase (Jeengar et al., 2014).

The luteolytic doses of PGF2 as the ideal treatment for luteal cyst, with estrus being evident within 3-5 days (Kahn, 2010).The effects with progesterone treatments were proposed to be mediated by restoration of the ability of hypothalamo-pituitary axis to generate an LH surge in response to an increasing estradiol (Todoroki and Kaneko, 2006).Moreover, when progesterone is used for estrus synchronization after embryo collection instead of PGF2, the proportion of cows developing OC decreased from ~25% to <3% (Brito and Palme, 2004).

Prevention of Cystic Ovarian Disease in dairy cows

Careful genetic choice and eliminating bulls that have sire daughters suffered from cystic ovarian disease is one method of COD prevention. Preferably, cows should not be treated for cystic ovaries and certainly their offspring should not be used for breeding (Kesler and Garverick, 1982). Good nutrition is essential, prevention has to begin with condition scoring midway through the previous lactation. Cows should be fed to achieve a score of 3.5 - 3.75 during the last half of lactation at dry off and maintained at this level through to calving. Adequate body reserves will help to decrease negative energy balance in early lactation. Close-up rations must be designed with the objective of minimizing the occurrence of hypocalcaemia, ketosis, abomasum displacement and other disorders which occur after calving. Numerous studies have demonstrated the beneficial effects of supplemental selenium along with vitamin A, vitamin E and beta-carotene in maintaining immune competency against cystic ovary (Geoffrey, 2001).

CONCLUSION AND RECOMMENDATIONS

The ovarian cyst in dairy cows is a widespread disease and a major concern all over the world, because it causes significant economic losses in the dairy industry. It reduces milk production and costs the dairy business money by increasing the number of days open, increasing the culling rate due to infertility, and increasing treatment costs. The following recommendations were made based on the above conclusion.

- ✓ Improve and enhance the fertility of dairy cows by selectively culling bulls whose sire daughters have COD.
- ✓ Dairy producers should be informed of the condition and should bring the cow to a veterinary clinic if the cow exhibits abnormal estrus behavior and fails to conceive twice or more times after insemination.

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