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Ovarian Cyst Disease in Cattle: Bioanalysis of Associated Hormones

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Abstract

Ovarian cysts are structures that appear on ovaries, their size reaches 2.5 cm in diameter or greater remaining for 10 days or more if they are untreated. They are classified into three major categories includes follicular cysts, luteinized follicular cysts, and cystic corpora luteal result in failure of reproduction in dairy cows. There isasignificant depression in the mean values of FSH and LH in the repeat breeder cows (infected group) when compared with the normal cows (control group). There is a significant elevation in the mean values of the prolactin hormone in the repeat breeder cows. In recommendation, balanced feeding to dairy cows with high milk production would decrease the risk factors associated with cystic ovary syndrome.

Keywords: Ovarian Cyst Disease in Cattle; prolactin; hormones; LH; FSH.

Introduction

Cystic ovarian disease (COD) in cattle leads to a decrease in the reproduction rate, resulting in significant economic losses for the dairy industry. Ovulation of a mature follicle is failed at the appropriate time during the estrous cycle.[1] Ovarian cysts, whose size reaches 20 mm in diameter lead to the disappearance of a corpus luteum, are classified as follicular and luteal. The follicular cyst wall thickness is less than 3 mm and more than 3 mm in the luteal cyst.[2] In infield conditions, this differentiation is difficult to recognize and is often omitted from the diagnosis.[3,4] The genetic predisposition for ovarian cysts is clear. Genetic selection would reduce the incidence of the disease from 11% in 1954 to 3% in 1977 in Sweden. Also, for cows with greater milk production.

COD is more prevailing.[5] Depending upon steroid production the ovarian cysts can be classified as follicular or luteal. The younger follicular cyst has a thick granulosa cell layer that disappears gradually with age. Luteal cyst is a luteinized follicular cyst with time.[6]

Gonadotropin-releasing hormone (GnRH) stimulates the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the anterior pituitary gland.[7] Luteinizing hormone (LH) or lutropin, is a hormone produced by gonadotropic cells found in the anterior pituitary gland.[8] Follicle-stimulating hormone (FSH) is a gonadotropin and, in other aspect is a glycoprotein polypeptide hormone which is synthesized and secreted in the same location when LH is secreted. FSH regulates the development,

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growth, and pubertal maturation. It works together with luteinizing hormone (LH) in regulating the reproductive processes of the body.[9] FSH initiates the growth of the ovarian follicles, specifically affecting granulosa cells. Slight a rise in FSH level at the end of the luteal phasethat seems to be of importance to start the next ovulatory cycle.[10] In response to eating, mating, estrogen treatment, ovulation, and nursing, prolactin (PRL) or luteotropic hormone is secreted from the pituitary gland.[11] Prolactin plays an essential role in metabolism, regulation of the immune system, and pancreatic development. Bole-Feysot *et al*. (1998) referred that prolactin is associated with milk production in mammals.[11,12]

Materials and Methods

1. Groups of Animals

Forty lactated cows were conducted in this study, twenty were infected with repeat breeder and, twenty were in a normal state as a control groupCows divided randomly into two groups (20) cows for each group and handled as follows: (I) Control group: Animals of this group fed on basal diet and ordinary tap water. (II) Twenty were infected with repeat breeders. The collected blood samples (5ml) were kept in tubes then, serum was separated by centrifuge at (3000 rpm) after that conserved at (-20 C$^{\bullet}$) in the freezer until used. The hormonal assay of FSA, LH, and PRL was estimated in the serum samples performed by solid-phase radioimmune-assay using standard kits. Results are expressed as mean ± SE. statistical analysis of data was performed based on two-way analysis of variance ANOVA II. Group differences and within-group differences were determined using the least significant difference (LSD) test at (P<0.05) (11).iChroma tests (iChroma - Boditech Med Inc.) for LH with REF 13010iChroma tests (iChroma - Boditech Med Inc.) for PRL with REF 164002.

2. Assay Procedur

By a transfer pipette (150 ul, 150 ul, and 150ul) was transferred these quantities of serum from each cow to a tube containing the detection buffer of the hormones FSH, LH, and prolactin levels respectively. Closure of the lid of the detection buffer tube was done, followed by mixing the sample thoroughly by shaking it about 10 times. Pipette out 75ul of sample mixture and load it into the sample well on the cartridge and left the sample in the loaded cartridge at room temperture for 15 minutes. When the incubation time is over, scanning of the sample immediately to obtain an exact result, then the sample was inserted into the cartridge holder of the instrument for I Chroma tests (I Chroma - Boditech Med Inc.). To start the scanning process would press the select button on the instrument for I Chroma tests. Reading of the result on the display screen of instruments for I Chroma tests must be performed after that.

Results

The results in Table 1 were revealed significant depression in the mean values of FSH and LH in the repeat breeder cows when compared with the normal cows. There is a significant elevation in the mean values of the prolactin hormone in the repeat breeder cow.

Table 1: Revealed the total number ofnormal and repeat breeder cows associated hormones

Total Number and the character of the cow	FSH level (mlu/ ml) ±Standard	LH level (mlu/ ml) ± Standard error	Prolactin level (ng / ml) ± Standard error
40 normal cow	1.625 ± 0.311	2. 575 ± 0.744	0.098 ± 0.033
40 repeat breeder cow	0.594 ± 0.431	0.445 ± 0.254	0.287 ± 0.172

(P<0.05)*

Discussion

Cystic ovarian disease is a serious cause to decrease the rate of reproduction in dairy cows. In mature females during a time of the estrus cycle, an acute rise of LH level proceed ovulation and development of the corpus luteum later. luteinizing hormone has a synergistic action with follicle-stimulating hormone (FSH).[13,14] Barui *et al*. (2015) were mentioned in their study that the results show significant depression in the level of FSH whereas, the level of LH did not show a significant difference.[15] Our study came in agreement with a previous study was done by Ahammed *et al*. (2018) who found significant depression in the levels of

the FSH and LH in Bangladesh.[16] No, refer to the level of prolactin hormone. A linear decrease in serum LH occurred in pregnant cows via pregnancy procession, whereas serum LH remained unaffected in non-pregnant cows.[17] LH is responsible for causing the rupture of the mature follicle will release the egg. Following ovulation, the LH also stimulates the development of the corpus luteum.[18] We are saying, an adequate quantity of LH or a low level of LH results in the failure of ovulation and proceeding with ovarian cyst later Regardless of the FSH and it's responsibility for the development of the ovarian follicle FSH shares LH in the secretion of estrogen from this follicle.[19] Our illustration for this case depends upon the failure of a low concentration of LH to rupture mature follicles through the phase of ovulation results in enlargement of ovarian cyst in the following estrus cycle. Prolactin is a protein that is best known for its role in enabling mammals, usually females, to produce milk.[11] Our observations and investigations through fieldworks are summarized to the most cows with repeat breeder were with high milk production because, they possessed a high level of prolactin and, these observations and investigations came withagree with multiple studies refer to the cystic ovary disease are more common in cows with greater milk production.[5,20] Sobrinho (2003) was referred to the cows with hyperprolactinemia tend to suppress the secretion of GnRH from the hypothalamus and in turn, decrease the secretion of FSH and LH from the anterior pituitary result in disrupting the ovulatory cycle.[21]

Recommedation

Balanced feeding to dairy cows with high milk production would decrease the risk factors associated with cystic ovary syndrome. Administration of prostaglandin (PGF2ά) after fifteen days of parturition to resolve the corpus luteum and predispose to the formation of the new ovarian follicle. Source of Funding The research was performed independently; there no funding, influence over study design, analyses, manuscript, or scientific publication.

Ethical clearance The project was approved by the local ethical committee (College of Veterinary Medicine/Diyala University).

Conflict of interest: Nil.

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