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**COMPARATIVE STUDY OF OVARIAN STRUCTURES AND FERTILITY
RATE FOLLOWING ADMINISTRATION OF HMG AND
GnRH HORMONES IN OVSYNCH PROGRAM IN HOLSTEIN DAIRY COW**

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ABSTRACT

This study was conducted to compare the structures of ovarian structures and fertility rate following the administration of HMG in a dairy farm with 500 cows in Azerbaijan region. Both ovsynch programs were administered to both groups such that the animals in the control group received 5 ml of the GnRH hormone (Gonadorelin) on the day 0, and the animals of the treatment group received 250 IU of HMG (Menotropine), then the ovaries of both groups were scanned on days 2, 4 and 6 by Real time ultra sonography with 5/7 MHz frequency. The size of antral follicles and corpus luteum created following follicular growth was determined and recorded. On the day 7, 3ml of prostaglandin F₂ α (Estroblen) was injected. On the ninth day, gonadorelin was injected again and 16-22 hours later the animals were artificially inseminated followed by estrus observation. At the day 30, the animals Pregnancy was diagnosed by ultra sonography. The data obtained from scanning the ovaries were statistically analyzed by the SPSS statistical software and T-test statistical method. The results of analyses showed a significant difference increasing follicle and Corpus luteum size between the two groups. Also, there was a significant difference between the two groups in estrus detection rate and pregnancy rates.

INTRODUCTION

The challenge is to improve the reproductive performance of dairy cows, including an understanding the biochemical and physiological fundamentals of reproduction and lactation process control in order to optimize a herd reproduction [6-8]. Synchronization of ovulation and artificial insemination in dairy cattle are the reproductive management tool. Synchronization hormone protocols are considered as the management tools cause a decrease of the voluntary postpartum period in dairy cows besides a suitable artificial insemination [15]. An Ovsynch hormonal protocol for ovulation in cattle using ovulation-stimulating hormone (GnRH) is an effective way to inseminate the cows. GnRH causes the release of gonadotropins FSH and LH which are the two hormones in the follicular growth and ovulation. However, the fertility rate of this protocol is not more than 40% [7]. Moreover, different gonadotropins have been used to increase the rate of ovulation in dairy and beef cattle. Human Menopausal Gonadotropin (HMG) is a gonadotropin with similar effects of FSH have more dominance to follicular growth [5]. According to some studies on beef and dairy cows and heifers, increasing amounts of estradiol in less time as well as reduced levels

of plasma progesterone levels in the long time have been reported [4]. So in this study, we tried to study the fertility rate, follicular growth and corpus luteum formation in the waves of follicular development and ovulation in the ovsynch protocol by replacing the HMG in ovsynch protocol and GnRH (gonadorelin) in dairy cows.

METHODS AND MATERIALS

This study was conducted on a dairy farm with 500 cows in Azerbaijan. A total of 50 non-pregnant cows with a calving interval of at least 30 days were selected and divided randomly into two groups of 25 cows in each followed by reproductive system examinations to ensure its healthiness. The ovsynch program was conducted. In the treatment and control groups such that 5 ml of GnRH (gonadorelin) was injected into the control group on the day zero and 250 IU (3 injections) HMG (menotropin) was injected into the treatment group. Both groups were scanned on days 2, 4 and 6 using Hitachi ultrasonography with a frequency of 7.5 MHz and the size of antral follicles in both ovaries were recorded. Furthermore, the size of the created corpus luteum following the follicular development was determined and recorded. On the seventh day, 3 ml of prostaglandin F₂ α (strogen) was injected. On the ninth day,

Gonadorelin was injected again. 16-22hours later the animals were artificially inseminated followed by estrus observation.

RESULTS

The obtained data of ovarian scans were analyzed statistically. The obtained data of the control and treatment groups were analyzed using SPSS software and T-Test statistical method; the results were as follows.

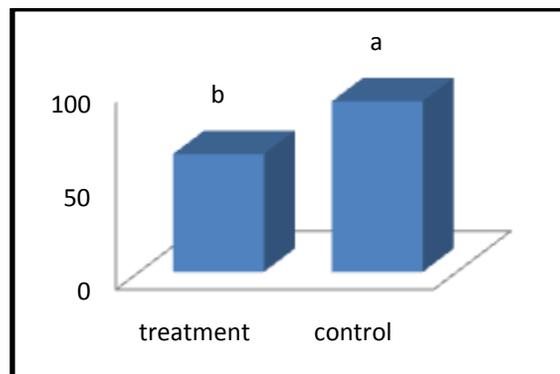


Figure 1: comparison of follicle size at base line between treatment and control groups. As seen in Figure 1, there is a significant difference in follicle size between the control and treatment groups ($P = 0.012$)

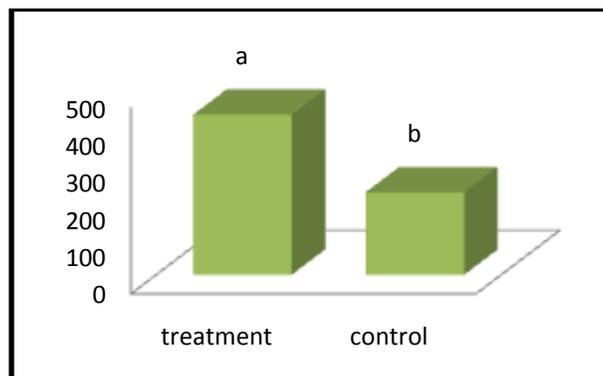


Figure 2: comparison of the corpus luteum size on the seventh day after the treatment between the control and treatment groups. The difference between treatment and control groups was significant ($P = 0.0148$)

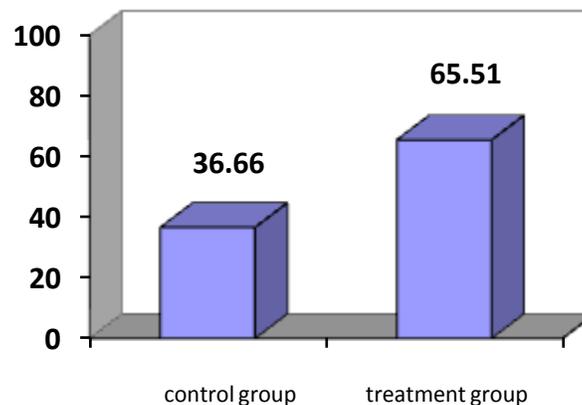


Figure 3: Comparison of the estrus rate between the treatment and control groups. The difference between treatment and control groups was significant ($P = 0.05$)

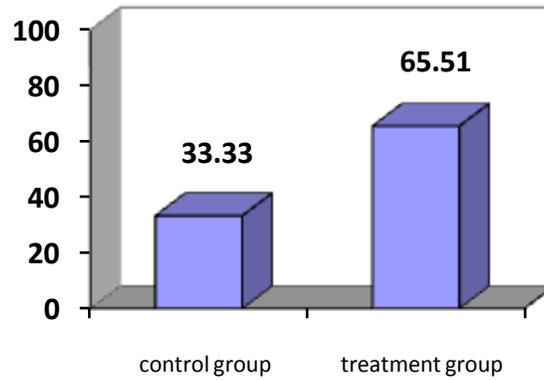


Figure 4: Comparison of the pregnancy rate between the treatment and control groups. The difference between treatment and control groups was significant (P = 0.05)

Image 1: Sonography of follicle samples of the control group



Image2: Sonography of follicle samples of the treatment group



Image 3: Asample of the control group's CL



Image 4: a sample of the treatment group's CL



DISCUSSION AND CONCLUSION

In this study, we tried to evaluate the follicular growth rate (the number of antral follicles and graph follicle size) in an ovulation follicular wave of ovsinch protocol. The results, then, were compared with a GnRH analogue (gonadorelin) in dairy cows. Menopause Women' blood gonadotropin or HMG (Human Menopausal Gonadotropin) having more dominance to follicular growth as well as the effects like FSH [17].

Considering the fact that in the studies on beef and dairy cows and heifers the maximum estradiol levels in less time have been reported [14], the size of CL and the percentage of estrus animals followed by treatment as well as the percentage of pregnancies among treatment group was significantly higher compared with the control group.

In a study conducted by Alcivar *et al* (1992) on beef heifers, no significant differences

were found in the number of ovaries CL in cows treated with HMG compared with cows treated with FSH.

It was found, in the mentioned study, that the luteinizing hormone concentration in blood serum reached a maximum level sooner than the group which was treated with FSH (47 hours versus 54 hours).

The study suggests that the time interval of FSH increase after injection of prostaglandin F2 α to induce next follicular wave was lower in HMG treated group compared with the group treated with FSH, and this means that the induction of follicular wave followed by CL erosion affected by HMG, occurred in less time (49 hours vs. 55 hours). Furthermore, the serum P4 levels in the group treated with HMG were slightly higher than the control group. In the present study, the generated CLs' size followed a follicular wave was significantly greater than the control group. Although the measurement of hormone levels (like P4) was not conducted in the present study, it seems that the plasma P4 concentration is higher in the treated group due to the significant bulk size of CLs in this group. However, there is a need for more studies in this field. Maybe higher levels of P4 concentrations in ovulation follicular wave is one of the reasons for higher levels of pregnancy in the treatment group, which

consequently causes the increased levels of LH hormone at least period that leads to ovulation.

In other studies higher concentrations of progesterone followed by PMSG administration were reported in treating animals [10, 19, 18, 16, 20]. In another study conducted by Lauria, *et al* (1982), it was reported that the plasma P4 rate reached to maximum levels 48-60 h after estrus following treatment with HMG.

In the present study, the CLs were investigated in ovsynch protocol and 7 days after treatment with HMG, the created CLs were evaluated quantitatively that were larger significantly in the treatment group.

Maurev *et al* (1983), in another study, showed significant difference in plasma P4 concentrations following administration of HMG. It has been reported in another study [1]. That concentrations of estradiol B17 have reached to peak levels significantly less time before ovulation in the group treated with HMG. This shows that the expression of estrus in treatment group, has improved considerably. In this study, the number of estrus animals subsequent implementation of the protocol was higher than the control group, although other estrus animals were inseminated in determined time. Increased concentrations of B17 estradiol in animals

treated with HMG have been reported in many studies [10, 3, 12, 2, 9]. As mentioned in recent studies, the increased plasma levels of estrogen followed by follicle growth induced by HMG, was considerably higher than the other FSH-like gonadotropins.

The results of the above mentioned studies were conformed to the results of the present study and the graph follicle size of treated cows with HMG was significantly higher compared with the control group, suggesting the better growth of follicles and consequently the higher levels of follicular liquid and estradiol compared with the control group. It is expected that the created CL size followed by the ovulation of such follicles probably would be larger and the rate of P4 would be higher.

The results of this study suggest that pregnancy rates in the treated group are significantly higher than the control group. As seen in the tables, the mean size of the corpus luteum in Ovsynch program was higher significantly in the treatment group compared with the control group.

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