

# COMPARATIVE STUDY ON THE EFFICACY OF HORMONAL AND NON HORMONAL TREATMENT METHODS IN OVARIAN AFUNCTION AFFECTED DAIRY COWS

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## Abstract

The study was carried out on 1090 Polish Black and White breed cows. Rectal examinations accompanied by blood plasma progesterone determinations performed twice in a 10-d interval diagnosed 178 ovarian afuction (OA) cases, which were consequently divided into 5 groups according to treatment regimen: controls; progesterone (PRID); massage; Lugol's solution; GnRH. Oestrus, first insemination and total pregnancy rates, artificial insemination (AI) index, and service period length were determined following treatment. The service period in all, except GnRH, treated groups, was statistically shorter ( $P \leq 0.05$ ) than in control. The overall results showed that PRID treatment of OA affected cows was the most effective method. Other regimens such as Lugol's solution and uterine as well as ovarian massage could be considered.

**Key words:** dairy cows, ovarian afuction, treatment.

Cattle productivity depends largely on reproductive efficiency, and is often measured by number of off-spring per breeding animal per unit of time. Since the ovary is one of the central organs of the reproductive system, its normal functioning is pivotal to the cow's breeding soundness and consequently profitability (14). Numerous studies have shown that ovarian afuction (OA) is still one of the most prevalent reproduction disorders in dairy cows despite technological advances in animal husbandry (3, 12). This is a complete ovarian inactivity with virtually no functional structures on the surface of both ovaries (8). Nutritional imbalance compounded with other factors is mainly responsible for its occurrence (17, 20). The appropriate nutritional, diagnostic and treatment methods would undoubtedly help in alleviating this disorder (12, 16). However, there have been no comparative studies on the effectiveness of different regimens for treatment of inactive ovaries in cows. The aim of this study was to evaluate and compare the

efficacy of various treatment methods of OA in dairy cows. Treatment strategy was mainly directed at stimulating the ovary through application of hormonal and non-hormonal remedies.

## Material and Methods

The study was carried out on 1 090 Polish Black and White breed cows from a dairy herd in the north-east part of Poland, which were examined during a three-year period. The animals were housed in individual tie-stall barns and mainly fed on grass and corn silage, hay and concentrate during winter, and on pasturage in summer months. Average milk yield was 4 000 kg per lactation period of about 310 d. Those animals that did not show any visible signs of oestrus before day 60 postpartum were clinically examined twice, in a 10-d interval. Blood samples for progesterone analysis were simultaneously collected from coccygeal vein into heparinised test-tubes. The collected blood was immediately centrifuged and plasma samples transferred into sterilised test-tubes and stored at  $-20^{\circ}\text{C}$  until assayed. Progesterone was analysed using RIA according to Hoffman *et al.* (5). Low ( $< 1\text{ng/ml}$ ) progesterone levels on both examinations was indicative of ovarian afuction.

Hundred fifty cows with OA were consequently divided into 5 groups according to the treatment regimen. Group 1 served as control. Group 2 was treated with a progesterone-releasing intravaginal device (PRID) containing 1.5 g of progesterone for 10 d. Group 3 received 2-3 min of uterine and ovarian massage. Group 4 had single intra-uterine infusion of 120 ml of 1% Lugol's solution. Animals in group 5 were treated with a single intramuscular injection of GnRH analogue, Buserelin, in the dose of 20  $\mu\text{g}$  (5 ml) per cow.

The fertility indices were analysed using analysis of variance, chi-square test and Student's *t*-test.

## Results

Eleven (47.8%) of the 23 (71.9%) control animals that came in oestrus conceived on the first service. Total pregnancy rate was 68.8%. The AI index of 2.0 and service period of  $173.1 \pm 41$  d were observed. In animals treated with PRID and massage statistically

significant differences ( $P \leq 0.05$ ) in the oestrus rate were found (80.6% and 80.0%, respectively). The service period in all, except GnRH treated groups, was significantly shorter ( $P \leq 0.05$ ) than in control, and the shortest one ( $109.0 \pm 26$  d) was in the PRID group. No differences in fertility indices were observed between the GnRH and control groups (Table 1).

**Table 1**  
A summary of clinical results in response to various treatment regimens

Control and treatment groups	Oestrus exhibition (%)	1 <sup>st</sup> service pregnancy rate (%)	Total pregnancy rate (%)	A.I. index	Service period (days) (x ± S)
Control n=32	71.9 <sup>a</sup>	47.8 <sup>a</sup>	68.8 <sup>a</sup>	2.0 <sup>a</sup>	$173.1 \pm 41^a$
PRID n=31	80.6 <sup>b</sup>	56.0 <sup>b</sup>	74.2	1.9	$109.0 \pm 26^b$
Massage n=35	80.0 <sup>b</sup>	57.1 <sup>b</sup>	77.1 <sup>b</sup>	1.9	$124.0 \pm 35^b$
Lugol's sol. n=22	68.2	53.3	59.1	1.5 <sup>b</sup>	$120.5 \pm 38^b$
GnRH n=30	70.0	36.7	66.7	1.9	$168.5 \pm 37$

a, b -difference statistically significant ( $P \leq 0.05$ )

## Discussion

The problem of postpartum infertility due to OA is one of the well known drawbacks in cattle production, resulting in substantial financial losses due to prolongation of the service period and culling (1, 4, 6). Different methods (hormonal and non-hormonal) of OA treatment have been employed, but data on their efficacy are conflicting.

One of the four treatment methods used in this study involved administration of progesterone in the form of PRID inserted into the vagina for a period of 10 d. The most striking finding in the PRID-treated group was the significantly ( $P \leq 0.05$ ) shorter service period in comparison to the control group. This result is in agreement with some earlier studies (2, 9, 22) and indicates that PRID treatment of OA in cows could be profitable. Similar results were described after treatment of OA in cows with a gestagen ear-implant Crestar (7, 15). The mechanism of the action of this device is based on a slow and steady release of progesterone, mimicking the luteal phase of the oestrus cycle (23).

Another trial was based on a single intramuscular injection of a synthetic analogue of GnRH, Buserelin. Its activity causes a rapid secretion of LH and FSH from the pituitary with subsequent elevation of the concentration of these hormones in peripheral blood (21). There was no difference in the service period length between the treated and control groups in this trial. The finding was in agreement with that observed by Linneweber (10). However, some earlier studies showed reduced interval from calving to conception in

relation to GnRH treatment (6). The overall results obtained in this trial bring in question the cost effectiveness of a single GnRH injection treatment of OA in dairy cows.

Ovarian response to Lugol's solution treatment was high in this trial and confirms earlier findings and assertion about the profitability of intrauterine Lugol's solution treatment of OA (13, 18), reflected in significantly reduced artificial insemination index and service period length. Therefore, Lugol's solution should be one of the drugs of choice for OA treatment.

The mechanism by which Lugol's solution acts on the reproductive system is not well understood. Intrauterine infusion of Lugol's solution causes hyperaemia of the utero-mucosa, a sign of enhanced circulation, which consequently leads to high degree of drug absorption. The absorbed iodine probably stimulates production of thyroid hormones which increase body's metabolism rate (19). This increased metabolic activity could be one of the triggering factors of ovarian function since one of the main causes of OA disorder is energy utilisation imbalance (17, 20). The enhanced uterine blood circulation might also influence ovarian activity.

Amongst all treatment methods employed in this study, uterine and ovarian massage is the cheapest since no drugs are used. The efficacy of this method in treating reproductive disorders has been reported (18, 22). The high first service and total conception rates observed in this group tend to question the wisdom of using costly methods in treating ovarian dysfunction cases when a cheaper and less laborious massage method is

likewise effective. The service period length observed in this trial was comparable to that reported by Romaniuk (18), where animals between days 90.6 and 92.7 postpartum were investigated. However, other studies (22), where treatment was initiated between days 60 and 80 postpartum show a relatively longer service period (152 d).

The mechanism by which massage brings back cows ovary to function is not clearly understood, but is probably the result of activation of intrinsic ovarian factors (11, 14), and enhancement of blood circulation (18). The uterine and ovarian massage is a simple and relatively viable treatment method that should be considered especially when dealing with economically disadvantaged cattle farmers.

The overall review of the results reveal that gestagen (PRID) treatment of OA was the most effective method resulting in a shorter service period than in control and other trial groups, while a single application of GnRH injection proved ineffective and should be discouraged. Alternative methods of treatment such as uterine and ovarian massage or Lugol's solution should be considered when necessary.

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