

## EFFICIENCY OF DAIRY COWS ESTROUS CYCLE RECOVERY AFTER TREATMENT OF REPRODUCTIVE DISORDERS

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**Abstract.** The aim of this study was to estimate the reproductive function disorders of dairy cows depending their age, productivity and holding mode and evaluate efficiency of hormonal stimulation of reproduction function the cows after recovery. Evaluate the incidence ovarian cysts and hypofunction of dairy cows and efficiency of hormonal stimulation of reproduction function after recovery. Selected analogous yielding (7000-7500 kg per lactation), different holding (A farm - 88 - bonded holding, B farm - 38, - loose holding), 1 - 4 lactation, 60 - 100 DM ( n= 126) open cows. We were done two experiments. First experiment: Cows are evaluated according to the ovarian condition and selected on 3 groups. 1 group (n=97) - healthy cows with typical derivatives in ovaries and with reproductive disorders - 2 group (n=20) with hypofunction ovary, and 3 group (n=9) ovarian cysts. Second experiment: All cows (healthy and after treatment of reproductive disorders) we were stimulated with prostaglandins and with by Ovsynch protocols. In the farm "A" cows with ovarian hypofunction were determined at 7.2 percent less than farm "B". Cysts on the farm "A" were determined at 12.8 percent more than at farm "B". Milk yield has impact on reproduction status. In the healthy group, the milk yield was 27.02±0.761, with ovarian hypofunction 26.55±1.694 and cysts 26.22±1.935. Hypofunction of the first lactation cows were determined 1.4 percent more than >4 lactating cows, ovarian cysts >4 lactating cows are 1.2 percent more than 1 and 2-3 lactation cows. Pregnancy rates with prostaglandin was 61.8 percent and Ovsynch - 68.0 percent. Cows which suffered from hypofunction are more likely to be pregnant than those with cysts.

Influence of milk yield and age on morbidity in ovarian cysts and hypofunction is wasn't evidenced. On reproductive disorders had influence housing. Recovered after treatment of hypofunction should be stimulated by prostaglandins by Ovsynch protocol. Recovered after treatment of cysts, need stimulate by Ovsynch, because efficiency was 2 time greater, in compare prostaglandins.

**Keywords:** Cows, Stimulation, Ovarian, Cysts, Hypofunction.

**Introduction.** A tendency has been observed that with increasing milk yield of cows, their reproductive functions decreases. Delayed recovery of ovarian function, prolonged period of service, it is associated with reproductive disorders of modern cow breeds (Shrestha et al., 2004). But those cows it is likely to breed by reproductive biotechnology. Cows with the greatest milk production have the highest incidence of infertility (Royal et al., 2000; Lucy et al., 2001). The reproductive function is affected by many factors: the method of holding, the age of the animal, the breed, and the quantity of milk production (Lucy et al., 1992).

Often it is occur reproductive disorders: cysts, hypofunction of ovaries, corpus luteum disfunction. For biotechnological procedures can be used healthy and cycling cows. Specific treatment is aimed at rebuilding and the diseased cows sexual cycle (Stevenson, Phatak, 2004).

To know reproduction cycle and estrous time usually reproductive function of cows it is stimulate. Effective response to stimulation it is possible reproductive healthy cows.

**Objective.** Evaluate the incidence ovarian cysts and hypofunction of dairy cows and efficiency of hormonal stimulation of reproduction function after recovery.

### Material and methods

The research was carried out in Lithuania, in two dairy cattle farms in 2016 – 2017. The research was conducted in accordance with the provisions of the Law of the Republic of Lithuania No. 1-2271 on Protection, Keeping

and Use of Animals, dated 03/10/2012 (Valstybės žinios (Official Gazette) No. 122-6126 dated 20/10/2012) and of the by-laws, Education and training purposes of animals used in storage, maintenance and conditions of use No. B1-866, dated 31/10/2012 (Valstybės žinios (Official Gazette) No. 130-6595 dated 10/11/2012).

Selected analogous products (7000-7500 kg per lactation) 126 (A farm - 88 - bonded holding, B farm - 38, - loose holding) 1 - 4 lactation cows which were not inseminated (60 - 100 days after calving). All selected cows n = 126 were fed the same ration of food. In the feeds rations dominate haylage, silage and concentrated feed is also added the vitamin-mineral supplements. The feed is divided 2 times a day - in the morning and in the evening, with the tractor feeders.

Two experiments were done. Experiment I. Cows are evaluated according to the derivatives of ovarian function and divided in to three groups.

Table 1. Cow grouping according to ovarian derivatives

Gynecological condition	Number of cows (n)
Healthy	97
Ovarian hypofunction	20
Ovarian cysts	9

It is considered that a cyst in the ovary, when was detected persistent, i.e. determined 2 times every 7 days, at least one follicle > 25 mm in diameter and was not set

corpus luteum. Cysts was treated to use GnRH which allowed two times with 50 mg/ml (Ovarelin, France), 2 or 7 days apart.

It is considered that the ovarian hypofunction, if there was not detected functional derivatives and condition in the ovary, does not change by repeating the study two times over a 7-day interval. The eCG (Folligon, the Netherlands) was used to treat ovarian hypofunction in a 300-800 TV.

Healthy cows had yellow body (YB) or follicles up 4 mm and after 7 days it was determined change in size corpus luteum and follicle.

A cow is considered to be healed if, after 7 days of treatment, no follicles larger than 25 mm have been detected or ovarian derivatives (YB or follicles) are detected in the ovary.

All groups of cows were subjected to prostaglandin stimulation or Ovsynch protocol.

#### Experiment II

Table 2. Grouping cows according to the performed stimulation

Synchronization scheme	Healthy	Ovarian hypofunction	Ovarian cysts
PGF <sub>2α</sub>	63	10	3
Ovsynch	34	10	6

Cow groups which corpus luteum diameter of 25 mm applied prostaglandin stimulation (76 cows) (Enzaprost was administered 2 times, 12 to 24 hours interval), inseminated with signs of oestrus. After setting the corpus luteum and follicle 10 mm diameter applied Ovsynch protocol (50 cows) (2.5 ml GnRH injection is allowed on Day 0, 2.5 ml of PGF<sub>2α</sub> is allowed for 7 days, 2.5 ml of GnRH is injected after 48 hours after prostaglandin injection) and performed timed insemination on 8 -18 hour after GnRh application.

After insemination, on 35-day we performed an ultrasound pregnancy test (CareSono HD 9300 Vet 6.5 MHz). The effectiveness of stimulation is measured by

the number of pregnancy.

Descriptive statistic of the sample (arithmetic mean  $\pm$  standard error) was calculated using SPSS statistical package (SPSS for Windows 15.0, SPSS Inc., Chicago, IL, USA, 2006). Statistical analysis of the data was carried out using the T test. The data was considered statistically significant when  $P < 0.05$ .

#### Results

In the farm "A" ovarian hypofunction is determined at 7.2 percent less cows than farm "B". Cysts on the farm "A" is determined at 12.8 percent more often than at farm "B". In the "B" farm 5.7 percent cows suffer from hypofunction and cysts ( $p = 0.030$ ;  $P < 0.05$ ) (Fig. 1).

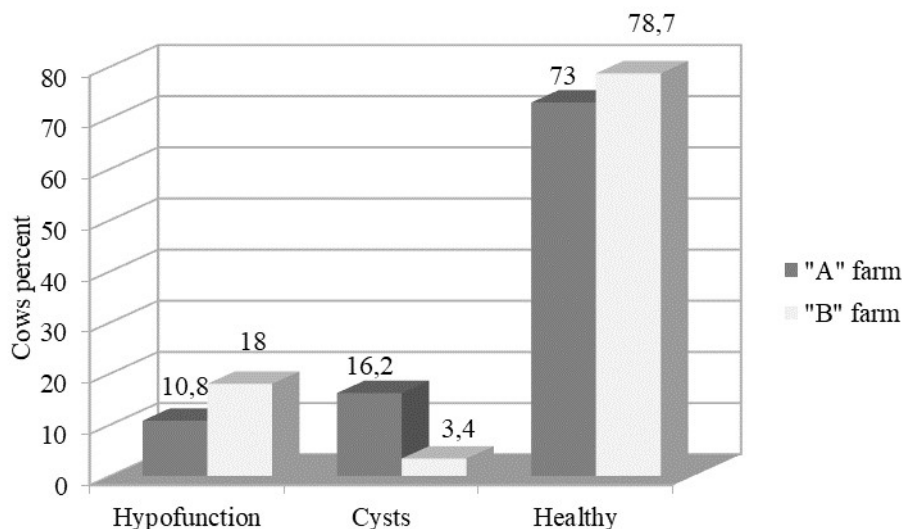


Fig. 1. Incidence of cow's ovarian functional disorders dependent from holding way

In the healthy cow group, the milk yield was  $27.02 \pm 0.761$ , with ovarian hypofunction  $26.55 \pm 1.694$  and cysts  $26.22 \pm 1.935$ . Figure 2 shows the dependence of ovarian derivatives on the milk yield of cows (Fig. 2). Ovarian hypofunction is determined in 0.8 percent, more often in a cow group with a milk yield of  $> 25$  l/day. Ovarian cysts are found in 0.9 percent, more often when milk levels of  $< 25$  l/day. The differences were statistically insignificant

( $P > 0.05$ ).

Hypofunction of the first lactation cows was 1.4 percent more than  $> 4$  lactating cows, ovarian cysts  $> 4$  lactating cows are 1.2 percent more than 1 and 2-3 lactation cows. Healthy cows 1.35 percent more determined than 1 lactation group 2-3 and 4 lactating cows. The differences were statistically insignificant ( $P > 0.05$ ) (Fig. 3).

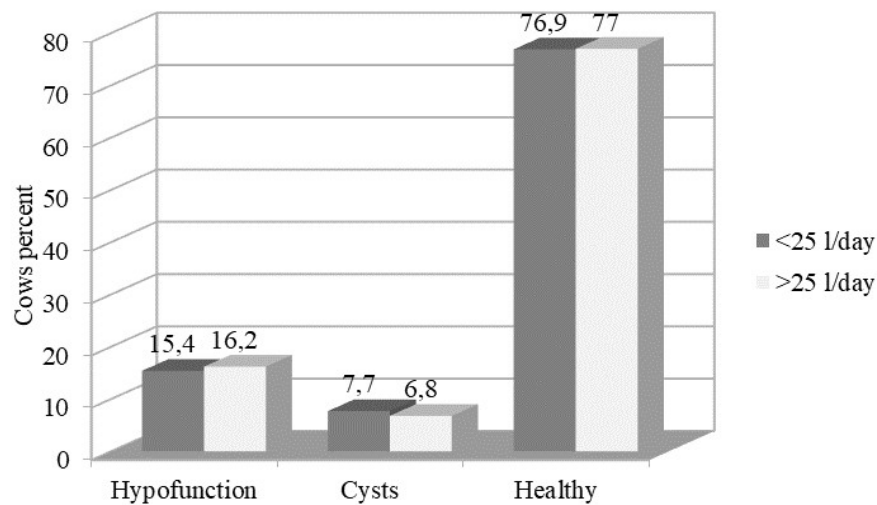


Fig. 2. Dependence of ovarian functional disorders on milk yield

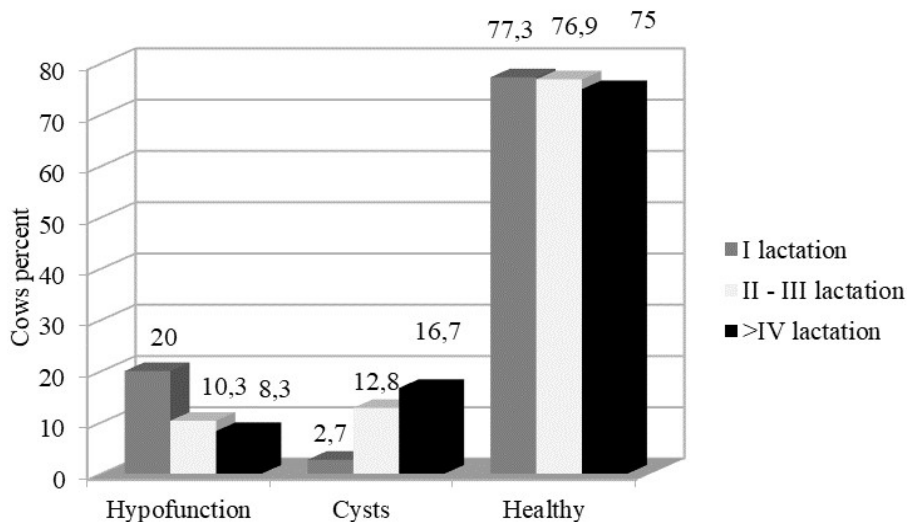


Fig. 3. Dependence of cows ovarian functional disorders on age

Regardless of the health condition of cows, stimulation way, pregnancy rates with prostaglandin was 61.8 percent and Ovsynch - 68.0 percent. In general, according to pregnancy the efficiency stimulation by Ovsynch protocol is similar as by prostaglandin. The difference is less one percent and statistical no significantly. Cows which suffered from hypofunction are more likely to be pregnant than those with cysts. It was detected use of the Ovsynch protocol is more effective (at 33.4 percent) ( $P < 0,05$ ) for cystic cows in comparison with prostaglandins. Prostaglandins it was more effective at 29.8 percent for healthy cows in comparison with Ovsynch. For no treated cows more suitable (1,8 time  $p < 0,05$ ) hormonal stimulation by prostaglandin protocol. (Fig. 4).

**Discussion.** The manner in which the cows are housed was found to affect the pregnancy rate after the first insemination. The average rate is higher when systems are adopted in which the cows have freedom of movement

(loose holding) than it is in tying stalls. Thus inactive ovaries are less common in animals in loose holding than they are in those in tying stalls. In tying stalls, in which the quantity of light which enters is in adequate, detection of oestrus is particularly difficult and the conception rates are often very poor. Alterations in the housing system, such as switching from tying stalls to loose holding with cubicles, which are often accompanied by enlargement of the herd as new cows have been purchased, will occasionally result in lower conception rates (De Kruif, 1978).

By ours data, higher number cows suffer from cysts in bounding holding farm, but from hypofunction disorders – in loose holding farm. Free of movement increases the intensity of the signs of oestrus, but also stimulates the onset of the cycle after parturition (Perry, 2011). In loose housing farm cows may be restricted feed consumption concern hierarchical behavior.

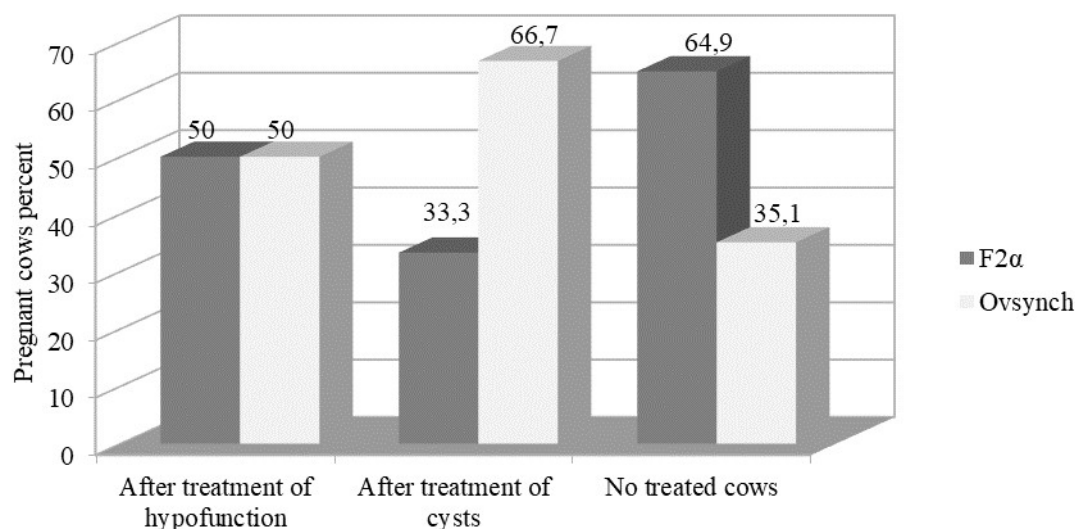


Fig. 4. Efficiency of hormonal stimulation of reproduction function the cows after recovery

In this way high yielding cows to be lacking of food energy. Indirectly by our data it is didn't confirm that more suffer from cysts higher yielding cows.

High production cows >30 l/days showing the higher percentage of reproductive function disorder compared to low productivity cows. So high levels of milk production do not have the same effect on cow rearing (Smith, 1993). There is a statistical relationship between dairy production and fertility in dairy cows (Royal et al., 2000).

By ours data, yielding does in small part impact on number cows with reproductive disorders. In higher yielding group were observed bigger number of cows with hypofunctional disorders ovaries. Percentage of healthy cows it was similar in both groups independent from yield.

The analysis of ovarian functional disorders, depending on age, showed a higher incidence of reproductive failure in cows of the first lactation. The main failure in this group it was found – hypofunction. F. Moreira (2001) found that about 37.3 percent ovulation of the first lactation cows does not occur, and the absence of ovulation for the second and lactation cows was determined at 15.7 percent. A. Gumen (2003) found that the first lactation cows were more often diagnosed with an anestrus state of 28 percent than the second and > 15 percent. Our data showed that the age of cows affect the incidence of cow's cysts. Ovarian cysts were found in group older cows – 4 lactation. Age of cows didnt impact on percentage of healty cows.

A. Gumen (2003) with a team of scientists has analyzed whether ovarian functional disorders affect the effectiveness of stimulation. The Ovsynch protocol was found to be 20.2 - 28.5 percent in ovarian hypofunction. In ovarian cysts, using prostaglandins, 66 percent are detected and 25 percent in the Ovsynch protocol pregnancy cows (Gumen et al., 2003). Our results showed that the results of Ovsynch are similar in cows when evaluating the effectiveness of stimulation after ovulation hypofunction treatment and after prostaglandin

stimulation, pregnancy rate was 50.00 percent. After ovarian cyst treatment and after stimulation, prostaglandins were diagnosed with 33.3 percent, using the Ovsynch protocol for 66.7 percent of cows.

K.L. Macmillan (2010), after analyzing previous studies, found that pregnancy rates of 59.7 percent in pregnant cows using prostaglandins F2 $\alpha$  for stimulation of healthy cows. To 65.1 percent. A similar percentage was found by other authors as well, a lower percentage of pregnancy cows was obtained by C. Hatvani (2013), which in a study showed that during pregnancy testing 30-36 days after artificial insemination, 130 (45.6 percent) cows (Hatvani et al., 2013).

According to our results, the incidence of pregnancy by stimulation with prostaglandins (F2 $\alpha$ ) was 61.8 percent cows. Our research results coincide with the most researchers.

J.R. Pursley (1998) found that, when using Ovsynch protocol for stimulation, after calving, pregnancy was 5 to 37 percent, and after 35 days, it was 53 percent after calving. A similar percentage was found by F. Moreira (2001), using the Ovsynch protocol 73 days after calving, 22.4 - 41.7 percent was pregnant. R.C. Chebel (2006), 62 days after calving, found that pregnancy ranged from 30 to 46 percent.

In a study conducted by C. Cevik (2010), the Ovsynch protocol showed that the of pregnancy ranged incidence from 32 percent to 76.92 percent, while C. Yilmaz (2011) found 37.83 percent. (Cevik et al., 2010; Yilmaz et al., 2011). O. Ergene (2012) identified the Ovsynch protocol's efficiency at 47.05 percent. cows (Ergene, 2012). Our study found that after using the Ovsynch protocol, pregnancy rates were 68.0 percent cows.

Influence of milk yield and age on morbidity in ovarian cysts and hypofunction is wasn't evidenced. On reproductive disorders had influence holding. The incidence of ovarian disorders are depending from housing system. The ovarian cyst more likely between cows housed in loose system. The hypofunction was

frequently diagnosed between cows housed in bonded holding system. The corpus luteum incidence was equal in all cases after treatment of hypofunction, and two times rare it was after treatment of ovarian cysts. After treatment it is possible to return cows in herd as milk cows or used as donors of oocytes, because they cycling it is rebuilt. Recovered after treatment of hypofunction should be stimulated by prostaglandins by Ovsynch protocol. Recovered after treatment of cysts, need stimulation by Ovsynch, because efficiency was 2 times greater, in compare prostaglandins.

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