

PREGNANCY RATE AFTER APPLICATION OF OVSYNCH ACCORDING TO THE RELIABILITY OF THE PROGRAM AND THE NUMBER OF COWS TREATED AT THE SAME TIME

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Abstract

The aim of the study was to evaluate the pregnancy rate after application of the OvSynch (OVS) programme depending on the reliability of the programme implementation and the number of cows treated at the same time. Taking into account the reliability of the programme, cows were divided into five groups. Females in group I were inseminated after the initial dose of GnRH, i.e. 1-6 days after the start of the programme, in group II – on days 7-9 of the OVS protocol, after administration of prostaglandin, in group III – on day 10, after completion of the full OVS protocol and timely insemination, and in group IV – on days 11-12, after completion of the full protocol and insemination according to estrous symptoms. Cows in group V were inseminated at a later period. Additionally, cows were divided into VI groups depending on the number of animals treated simultaneously during the periodic veterinary visit. Groups A, B, C, D, E and F consisted respectively of 1, 2, 3, 4, 5 and 6 cows treated on the same day. Examination for pregnancy was performed twice – on the 28th and 56th day after insemination using an iScan ultrasound device (Draminski) equipped with a 7.5 MHz linear probe. Large differences in mating rates were shown between farms. Taking into account the timely execution of the OvSynch programme, the highest – 42.3% – mating rate

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was recorded in cows in which the OVS programme was executed correctly. In the other groups it was significantly ($P < 0.05$) lower. In the case of simultaneous OvSynch in 6 cows, the percentage of correctly executed programs amounted to 83.3% and was significantly higher than in the case of treatment at smaller groups. Using the OvSynch program, the highest pregnancy rates are guaranteed by timely administration of the prescribed injections and insemination at the appointed time. Deviation from the protocol results in a worsening of the pregnancy rate. A higher number of treated cows guaranteed a higher percentage of correctly executed OvSynch programmes. Reasons for this situation were discussed.

Keywords: OvSynch, performance reliability, calving index, cows

Introduction

Developed in the late 1990s, the OvSynch oestrus and ovulation synchronization program is one of the commonly used for both dairy cow reproduction management, assisted reproduction programs and intervention activities [1-3]. A properly executed programme, with correct feeding and animal welfare, ensures the achievement of at least a satisfactory calving rate [4,5]. In its classical form, the programme lasts ten days and consists of three hormone injections and insemination at a set time. In general, the aim of the first dose of GnRH (G) is to provoke the growth of a wave of ovarian follicles, or to ovulate an already existing large follicle. The administration of prostaglandin (PG) induces oestrus in those females with an active corpus luteum on day 7 of the programme and the next dose of GnRH induces ovulation of a large ovarian follicle. Insemination of cows prepared in this way is carried out at a precisely determined time – 24 hours after the final dose of G. In daily practice OvSynch is used in reproduction management programmes, or intervention – in cows repeating or not showing oestrus. The individual injections in large herds where reproduction management is based on hormone programmes are usually carried out by one person – the veterinarian, technician, barn staff or owner. On smaller farms, when OvSynch is used as an intervention, the first injection is usually done by a vet and subsequent injections are done by a trusted person. The calving rate after application of the OvSynch programme depends on, among other factors, the phase of the estrous cycle, the hormone dose, the number of previous inseminations [6], and the condition of the cows [7-9]. The effectiveness of the OvSynch programme is also higher in primiparous cows compared to multiparous cows [8,10], and in cows with a daily milk yield ≤ 28.5 kg compared to cows with a daily milk yield

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>28.5 kg [11].

Among the factors affecting the effectiveness of the OvSynch programme, the human factor is rarely taken into account. It cannot be excluded that untimely administration of hormones, or more likely omission of any hormones or untimely insemination, may be the reason for unsatisfactory results. The scale of such cases is not precisely known. It was also decided to verify whether the effectiveness of the programme could also be the result of different numbers of animals undergoing the programme. Our undocumented observations give rise to a suspicion that these shortcomings occur more frequently when the programme is carried out with single cows than with several animals at the same time.

Aim Of The Study

The aim of the study was to evaluate the calving rate taking into account the reliability of the OvSynch programme and the number of cows treated at the same time.

Material And Methods

The evaluation considered data collected between 2008 and 2021, which included a total of 460 cows. They came from 7 herds, ranging from 120 to 250 individuals. A total of 12833 reproductive cycles were analysed. In each herd, periodic examinations were carried out at 3-week intervals, during which pregnancy was diagnosed and idle animals were treated. Some of the cows not showing oestrus, or repeatedly, unsuccessfully inseminated were qualified for intervention treatment using the OvSynch programme. Females received an initial dose of GnRH (0.89 µg of buserelin acetate – 2.5 ml of Receptal, MSD), then on day 7 of the programme a synthetic prostaglandin derivative (0.5 mg of cloprostenol, contained in 2 ml of Estrumate, MSD), and after 48 h a final injection of GnRH. Insemination was performed at a fixed time – 16-24 h after GnRH administration. Examination for pregnancy was performed twice – at 28 and 56 days after insemination using an iScan ultrasound device (Draminski) equipped with a 7.5 MHz linear probe. Cows treated with OvSynch were divided into 5 groups. Group I included females in which insemination was performed 1-6 days after the first GnRH injection. Group II included females inseminated between 7 and 9 days after the start of the programme, group III – females who received the full OVS programme, group IV – females inseminated 11 and 12 days after the start of the programme and group V – females

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inseminated later. The same cows were then allocated to 6 groups, taking into account the number of simultaneously treated cows per farm. Group A consisted of cows treated individually, group B - two cows treated at the same time, C - 3, D - 4, E - 5, and F - 6 cows treated simultaneously. The significance of the obtained differences was assessed using the chi-square test in the Statistica 13.3.

Results and Discussion

Table 1. Calving rates in cows treated using OvSynch on different farms

Serial number of the farm	Number of cows qualified for the OvSynch programme	Calved cows	
N	%		
I	98	27	27.6% ^{ab}
II	84	31	36.9% ^{ab}
III	57	7	12.3% ^{ab}
IV	14	5	35.7% ^{ab}
V	38	6	15.8% ^{ab}
VI	87	11	12.6% ^{ab}
VII	82	26	31.7% ^{ab}
Total:	460	113	24.6%

^{ab} - $p < 0,05$

Table 2. Calving rate according to the day of insemination during the OvSynch programme

Group	Inseminated cows	Calved cows
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N	%	N	%	
I (1-6 days)	21	4.6%	3	14.3%
II (7-9 days)	62	13.5%	19	30.6% ^{ab}
III (10 days)	182	39.6%	77	42.3% ^a
IV (11-12 days)	42	9.1%	14	33.3% ^{ab}
V (> 12 days*)	153	33.2%	–	–
Total:	460	100%	113	24.6%

^{abc} $p < 0,05$

* – when more than 12 days have elapsed since the start of the programme cows were not included in the statistical analysis

Table 3. Effectiveness of the OvSynch programme in relation to the number of cows simultaneously qualified for the programme

Number of cows treated with OVS during one survey	Group	Number of cows qualified for OVS	Properly executed OVS programme		
N	%	N	%		
1	A	231	50.2%	74	32.0% ^c
2	B	102	22.2%	51	50.0% ^{ab}
3	C	36	7.8%	19	52.7% ^{ab}
4	D	54	11.8%	19	34.5% ^{bc}

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5	E	25	5.4%	10	40.0% ^{abc}
6	F	12	2.6%	10	83.3% ^a
Total:	460	100%	183	39.8%	

^{abc} $p < 0,05$

The total pregnancy rate was 24.6%, but large differences were marked in individual herds (from 12.6% to 36.9%). It was lower, compared to results obtained by other authors [12-14].

With regard to all 460 cows, a correct 10-day OVS, completed by insemination on the set date, was performed in 39.6% of the females. Of these, 42.3% were calved, which is significantly more than in the other groups ($P < 0.05$). The results obtained are similar to those obtained by other authors [12-14]. In 4.6% of cows, insemination was performed immediately after the first dose of GnRH – between 1 and 6 days after injection. The pregnancy rate in this group of animals was 14.3%. After the administration of PG (day 7-9), 13.5% of cows were inseminated and 30.6% of them became pregnant. Higher pregnancy rates for 10-day OVS compared to 9-day OVS were also shown by other researchers [15,16]. On days 11 and 12, 9.1% of cows were inseminated, of which 33.3% of cows calved. In the remaining 33.2%, insemination occurred >12 days after the start of OVS. The results of pregnancy in this group of cows were not included in further analyses. The reasons for the unreliable execution of the OVS programme resulting in lower pregnancy rates are unclear. Partially understandable could be the insemination of cows in full-symptomatic heat, i.e. shortly after the administration of PGs – because at least in theory it should provide satisfactory results. However, according to our own research, insemination after the first injection of GnRH, or late insemination after the final administration of GnRH do not give such guarantees. It seems that giving an initial dose of GnRH by a veterinarian and then committing a trusted person to administer subsequent hormonal injections does not guarantee success. In nearly 60% of the OVS protocols started, these individuals did not follow the previous arrangements, changing the protocol to varying degrees, resulting in insemination at a different time. The changes made were the reason for obtaining poorer pregnancy results.

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In the investigated cow herds, the OvSynch programme during the periodic gynaecological examination was most frequently applied to single cows, while it was least frequently applied to several cows at the same time. While the OVS programme was applied to 6 cows there was a very high – 83.3% guarantee of its reliable implementation. It was significantly higher ($P < 0.05$) than in groups with a smaller number. The OVS was performed least accurately in single individuals. It is possible that in the case of single cows, for some reason, the personnel assigned to administer subsequent hormone injections ignored this necessity. Administration of subsequent doses of hormones in the case of a larger number of cows. To sum up, the research emphasised the importance of the so-called human factor which boils down to a reliably executed programme. There is not the slightest doubt that the percentage of improperly executed programmes is alarmingly high, in herds where the programme is carried out not only by a doctor, but also by third persons. It also appears that the low effectiveness of the OvSynch programme may not necessarily be the result of known risk factors [17]. In a significant percentage, it may also be the result of gross shortcomings during the execution of the programme. Our observations once again highlight the importance of a proper collaboration between the veterinarian and the technical staff. The lack of a suitable relationship may, on the one hand, aggravate reproductive disorders in the herd, on the other hand, cause justified frustration of the breeder and, consequently, abandonment of the programme.

Conclusions

The OVS programme can be an effective way to treat cattle infertility. In problem cows, if carried out on time, it ensures a satisfactory mating index. Unreliable implementation of the programme, consisting in the omission of hormonal preparations at the set time or skipping their administration by selected contractors, results in a significant decrease in the mating index. It also seems that simultaneous treatment of several cows gives a greater guarantee of reliable implementation of the programme than its application in individual cases.

References

[1] Bisinotto R. S., Santos J. E. P. 2011. The use of endocrine treatments to improve pregnancy rates in cattle. *Reproduction, Fertility and Development*, 24(1), 258.

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[2] Fleischer P., Metzner M., Beyerbach M., Hoedemaker M., & Klee W. 2001. The Relationship Between Milk Yield and the Incidence of Some Diseases in Dairy Cows. *Journal of Dairy Science*, 84(9), 2025-2035.

[3] Baruselli P. S., Marques M. de O., Carvalho N. A. T. de, Berber R. C. de A., Valentim R., Carvalho Filho A. F. de, Costa Neto W. P. 2003. Dinâmica folicular e taxa de prenhez em novilhas receptoras de embrião (*Bos taurus indicus* x *Bos taurus taurus*) tratadas com o protocolo "Ovsynch" para inovulação em tempo fixo. *Brazilian Journal of Veterinary Research and Animal Science*, 40.

[4] Thatcher W. W., Mattos R., Moreira F., Binelli M., Ambrose J. D. 2000. Experimental manipulation of follicular growth. *Reprod.Domest. Anim. (Suppl. 6):27-33*.

[5] Butler W. R. 2000. Nutritional interactions with reproductive performance in dairy cattle. *Anim. Reprod. Sci.* 60-61:449-457

[6] Morgan W., Lean, I. 1993. Gonadotrophin-releasing hormone treatment in cattle: a meta-analysis of the effects on conception at the time of insemination. *Australian Veterinary Journal*, 70(6), 205-209

[7] Galvão K. N., Santos J. E. P.: 2010. Factors Affecting Synchronization and Conception Rate after the Ovsynch Protocol in Lactating Holstein Cows. *Reprod. Dom. Anim.*, 45, 439-446.

[8] Jeong J.K., Kong H.G., Jung T.H., Hur T.Y., Kim I.H. 2014: Risk factors for the probability of pregnancy following synchronization protocols in dairy cows. *J. Vet. Clin.* 31: 382-388

[9] Moreira F., Risco C., Pires M.F., Ambrose J.D., Drost M., DeLorenzo M., Thatcher W.W. 2000: Effect of body condition on reproductive efficiency of lactating dairy cows receiving a timed insemination. *Theriogenology* 53: 1305-1319

[10] Yáñez J.L., Murugavel K., López-Gatius F. 2004: Recent developments in oestrous synchronization of postpartum dairy cows with and without ovarian disorders. *Reprod Domest Anim* 39: 86-93

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- [11] Crane M.B., Melendez P., Bartolome J., de Vries A., Risco C., Archbald L.F. 2006: Association between milk production and treatment response of ovarian cysts in lactating dairy cows using the Ovsynch protocol. *Theriogenology* 66: 1243-1248
- [12] Brusveen D. J., Souza A. H., Wiltbank M. C. 2009. Effects of additional prostaglandin F2 α and estradiol 17- β during Ovsynch in lactating dairy cows. *J. Dairy Sci.*, 92, 1412-1422
- [13] Yilmazbas-Mecitoglu G., Karakaya E., Keskin A., Alkan A., & Gumen A. 2013. Reducing the duration between gonadotropin-releasing hormone (GnRH) and prostaglandin F2 α treatment in the Ovsynch protocol to 6 days improved ovulation to second GnRH treatment, but inclined to reduce fertility. *Journal of Dairy Science*, 96(6), 3817–3824.
- [14] Turpel E., Wehrend A.: Hormonal treatment in cow reproduction – positives and negatives. *Biotechniki stosowane w rozrodzie zwierząt gospodarskich i koni.*, UP w Poznaniu 2016, S. 73-79.
- [15] Pursley R. J., Silcox R. W., & Wiltbank M. C. 1998. Effect of Time of Artificial Insemination on Pregnancy Rates, Calving Rates, Pregnancy Loss, and Gender Ratio After Synchronization of Ovulation in Lactating Dairy Cows. *Journal of Dairy Science*, 81(8), 2139–2144
- [16] Geary T. W., Whittier J. C., Thrift F. A., & Dolezal S. L. 1998. Effects of a Timed Insemination Following Synchronization of Ovulation Using the Ovsynch or CO-Synch Protocol in Beef Cows. *The Professional Animal Scientist*, 14(4), 217–220.
- [17] Jaśkowski J.M., Sobolewski J., Herudzińska M., Nalaskowska M., Kulus J., Brüssow K.-P. 2018: Probability of pregnancy and risk factors of Ovsynch program and its modification in dairy cows. *Acta Vet.* 87, 197-204