

**STIMULATION OF SUPEROVULATION AND REMOVAL OF EMBRYOS WITH REGARD TO THE SUBSEQUENT CONCEPTION AND MILK YIELD OF DONOR COWS**

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**Abstract**

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The impact of superovulation stimulated by FSH-P on subsequent conception in embryo donors was studied on a group of 162 cows. After the recovery of embryos 121 animals (74.68 %) conceived after three subsequent inseminations; 59 of them (48.76 %) conceived after the first insemination. The highest conception rate after the first insemination (53.19 %) was recorded in cows super-ovulated within 60 days of parturition.

On the average the donors conceived within 67.6 days and the animals superovulated within 60 days of parturition conceived within 59.11 days. The mean service period (SP) was about 148 days. In donors flushed within 60 days parturition it did not exceed 110 days. The milk yield of the donors remained practically unaffected by the super-ovulation proper and by embryo removal in the experimental group of animals and the decrease of milk yield per day and per animal did not exceed 0.66 kg.

*Embryo transfer, superovulation, fertility, lactation, luteolysis.*

The stimulation of superovulation in cows with the help of hormones of serum or pituitary origin affects the endocrine system of the animal considerably and causes significant functional and morphological changes in the sexual sphere of the donor cows. Depending on the character and extent of the superovulation the mass and volume of the ovaries increases, conditioned by the extent of the follicular and luteal reactions (G r e - v e and L e h n - J e n s e n 1978).

Parallel to the development of the superovulation reaction change also the character, level and sequences of the FSH and LH peaks, alongside with the level of estrogens and gestagens, increasing considerably as against physiological levels, especially following the administration of serum

gonadotropin (S o l t i and G r e v e 1978; G r e v e et al. 1984ab).

The endocrine superovulation changes on the level of target organs can naturally influence the state and function of the tubular organs (i.e. of the oviducts, uterus and the cervix), which can affect both the ascent of the sperms after insemination, and also the fertility, descent and development of the ova and embryos. This abnormal endocrine and functional-morphological condition can affect also the activities of mammary gland closely connected with the activities of the ovaries.

Possible impairment of fertility and milk production as a consequence of superovulation in donor cows are the most frequent arguments used by breeders against the transfer of embryos, especially in cases when the donor animals are selected from the category of highly productive cows soon after calving, and during their full milk production.

In view of the fact that the information of the influence of superovulation on the subsequent fertility and on milk production of the animals is very scarce, we tried to study these problems under defined conditions in one of our most progressive dairy farms belonging to the Slušovice Agricultural Co-operative. Here the embryo transfer has been practiced on a wide scale ever since 1984, and is an integral part of the controlled reproduction of cows and heifers.

### Materials and Methods

The donors (black-and-white lowland (Holstein) cattle) aged 3 - 12 years were superovulated at various times after calving, exclusively with pituitary gonadotropin (FSH-P) in the form of Folicotropin brand product produced by Léčiva Prague, applied in most cases in the form of series of 8 injection within 4 days a total dosis of 24 - 28 mg (4-4, 4-4, 2-2 and 2-2 mg). Alongside with the 5th and 6th injection Cloprostenol (Oestrophan, Spofa) was also applied, namely at a dosis of 500 µg i.m. The second injection of luteolytics was administered in half of the cases in the form of submucous vestibulo-vaginal application at a dosis of 250 µg. In cows of bigger stature the dosis of Folicotropin was increased by 2 - 4 mg (6-4, 4-4, 2-2, 2-2 or 6-6, 4-4, 2-2, 2-2 mg, eventually 6-4, 4-4, 4-2, 2-2 mg).

The beginning of stimulation with Folicotropin coincided with the middle of the observed or synchronized previous cycle, always with the existence of the corpus luteum and the injections were administered in 12-th intervals, i.e. at 7 a.m. and at 7 p.m.

The first insemination took place roughly 56 hours following the first application of luteolytic, and further two followed in 12-th intervals in the course of the next day with a double dosis of deep-frozen semen.

The recovery of embryos usually fell on the 7th day of the cycle (the day of oestrus being D<sub>0</sub>) and immediately after recovery the donors were luteolyzed with Oestrophan (Spofa), with 500 mg doses i.m., so as to speed up their return to the further reproduction programme.

In the donors we followed the sexual activity and conception in the course of the first 3 inseminations after the removal of embryos, and at the same time their milk production was also checked, namely a month before and a month after the removal of embryos.

The influence of superovulation and the recovery of embryos on the subsequent reproduction capacity of cows was followed in 197 donors, in which superovulation was carried out repeatedly in 21 cases and milk yield was checked following superovulation in a total of 239 animals.

The donors were divided into three basic groups with regard to the interval between parturition-superovulation and the recovery of embryos.

The first group included superovulated and flushed animals up to 60 post-parturition days, the second group consisted of subjects stimulated and flushed between the 61st and 80th post-parturition day, while the third group was formed by cows superovulated and flushed after the 81th post-parturition day.

## Results

### Conception of superovulation and return of the donor cows to further production

Within 60 days of parturition (group No. 1) superovulation and recovery of embryos were carried out in 77 dairy cows; in the course of the first three inseminations 62 of them were included in our evaluation (Table 1).

Following the first insemination 25 cows became pregnant (40.32 %), after the second 14 (22.56 %), and after the third 8 (12.90 %). In the course of the first three inseminations 47 animals conceived, i.e. 75.81 % of the total number of evaluated animals.

Out of 58 superovulated donor cows in the period between the 61st and 80th day following the parturition (Group No. 2) 48 donors were evaluated. In this group after the first insemination 15 animals (31.25 %) conceived, while 10 (20.83 %) became pregnant following the 2nd insemination and 8 (16.67 %) after the third insemination. In the given category a total of 33 donors, i.e. 68.75 %, became pregnant.

Out of the group of 62 animals superovulated and flushed only following the 81st post-parturition day (group 3) further fertility was followed in 52 cows. After the first insemination 19 cows (36.53 %) became pregnant, after the second 14 (26.92 %) and after the third 8 (15.38 %). In this group a total number of 41 animals, i.e. 78.85 % conceived after the first three inseminations.

Out of the total set of 197 superovulated and flushed dairy cows so far 162 animals (82.23 %) have been put back to the process of reproduction; 59 of them (36.42 %) became pregnant following the first insemination, 38 (23.46 %) after the second insemination, and after the third followed 24 donors (14.81 %), and thus a total of 121 cows, i.e. 74.69 % conceived.

Observations of the pregnant donors with special regard to the moment of their post-parturition superovulation stimulation and flushing (Table 2) it appeared that out of the 47 pregnant animals in group No. 1 (i.e. animals flushed within 60 days of calving) 25 animals (53.19 %) conceived following the 1st insemination, 14 (29.79 %) of them became pregnant after the 2nd insemination and 8 (17.02 %) after the 3rd insemination.

In the second group a total of 33 cows - donors conceived - 15 (45.45 %) of them following the first insemination, 10 (30.30 %) after the 2nd and 8 (24.24 %) after the 3rd inseminations.

In the third group 41 donors superovulated relatively late (after more than 81 days following the parturition) 19 (46.34 %) conceived following the first insemination, 14 (34.15 %) after the second and 8 (19.51 %) cows after the third insemination.

Out of the total number of 121 pregnant animals following the 1st-to-3rd insemination (Table 2) 59 (48.76 %) conceived, after the second 38 (31.40 %) and after the third insemination 24 (19.83 %). From Table No. 2 it can be seen that the earlier follows the superovulation and flushing after parturition, the better the chances for conception after the 1st insemination.

The relation of the time of superovulation and of the embryo removal following parturition to the removal-conception interval in pregnant donors

**Table 1**  
**Relation between post-parturition embryo removal time in superovulated and evaluated donors, and between conception during individual inseminations**

Time of super-ovulation and embryo removal following parturition	Total number of cases	Number of evaluated donors	Conceptions following the 1st - 3rd conception						Total number of conceptions	
			I		II		III			
			Number	%	Number	%	Number	%		
Within 60 days (group No. 1)	77	62	25	40.32	14	22.58	8	12.90	47	75.81
61 - 80 days (group No.2)	58	48	15	31.25	10	20.83	8	16.67	33	68.75
81 and more days (group No.3)	62	52	19	36.53	14	26.92	8	15.38	41	78.85
<b>T o t a l</b>	<b>197</b>	<b>162</b>	<b>59</b>	<b>36.42</b>	<b>38</b>	<b>23.46</b>	<b>24</b>	<b>14.81</b>	<b>121</b>	<b>74.69</b>

**Table 2**  
**Influence of the time of superovulation and of embryo removal on the conception of pregnant donors**

Time of superovulation and of embryo removal after parturition	Total number of conceptions	Conception rate following the individual inseminations					
		I.		II.		III.	
		Number	%	Number	%	Number	%
Within 60 days (group No. 1)	47	25	53.19	14	29.79	8	17.02
61 - 80 days (group No. 2)	33	15	45.45	10	30.30	8	24.24
81 and more days (group No. 3)	41	19	46.34	14	34.15	8	19.51
<b>T o t a l</b>	<b>121</b>	<b>59</b>	<b>48.76</b>	<b>38</b>	<b>31.40</b>	<b>24</b>	<b>19.83</b>

Table 3  
 Time of superovulation and embryo removal after parturition with regard to the removal-conception interval in pregnant donors

Time of superovulation and removal following parturition	Number of evaluated animals	Removal-conception interval after the 1st - 3rd insemination			After the 2nd insemination			After the 3rd insemination		
		Total number of pregnant animals and % of pregnant animal	removal-conception interval in days	number and % of pregnant animal	removal-conception interval in days	number and % of pregnant animal	removal-conception interval in days	number and % of pregnant animal	removal-conception interval in days	number and % of pregnant animal
Within 60 days (group No. 1)	62	47 75.81	59.11	25 53.19	42.44	14 29.79	61.14	8 17.02	107.63	
61 - 80 days (group No. 2)	42	33 68.75	72.36	15 45.45	49.20	10 30.30	74.60	8 24.24	113.00	
81 and more days (group No. 3)	52	41 78.85	73.49	19 44.37	47.63	14 34.15	72.29	8 19.50	137.00	
T o t a l		121 74.69	67.60	59	45.83	38	68.79	24	119.21	

is expressed in Table 3.

In the first category of donors, i.e. in cows flushed up to the 60th post-calving day, 62 animals had been superovulated, flushed and evaluated; 47 (75.81 %) of the group became pregnant following the 1st to 3rd insemination, on the average within 59.11 days following the flushing. Following the 1st insemination 25 recipients conceived in 42.44 days, after the 2nd insemination 14 animals became pregnant in 61.14 days and after the third 8 cows within 107.63 days.

In the second group of donors flushed between the 61st to 80th post-parturition day a total of 68.75 % of the recipients (33 from 48) became pregnant within an average of 72.36 days following the removal. After the first insemination 15 dams (45.45 %) conceived within 49.2 days after recovery, after the second insemination 10 cows (30.30 %) within 74.6 days, and after the third insemination 8 cows (24.24 %) resulted pregnant within 113 days following the recollection of embryos.

The third group flushed after the 81st post-calving day comprised 52 animals and became pregnant within 73.49 days on the average. In this group 41 animals conceived (78.85 %) following three subsequent inseminations. After the first insemination (Tab. 3) 19 cows (47.63 %) became pregnant within 47.63 days following the recollection, after the second insemination 14 recipients in 72.29 days, while 8 dams conceived in 137 days following the third insemination (19.51 %).

From the total number of superovulated and flushed donors 121 animals (74.69 %) conceived on the average within 67.6 days following the removal of embryos. After the first insemination pregnancy occurred within 45.83 days, after the second insemination within 68.79 days, and following the third insemination within 119.21 days.

The calving-conception interval (service period - SP) in superovulated and flushed donors appeared in the following way (Table 4):

The SP interval in the cows of the first group was 110.51 days. After the first insemination the donors became pregnant within 92.8 days, after the second within 114.3 days and after the third insemination within 159.1 days.

In the second group of cows flushed between the 61th and 80th days the mean SP interval was 142.9 days. After the first insemination conception occurred in 119.1 days, after the second insemination in 145.1 days, and after the third in 185 days.

In the third group of donors the SP interval was extended to 195.7 days on the average, reaching a mean interval of 161.95 days after the first insemination, and of 262.38 days following the second insemination.

If we evaluate the group of 121 pregnant cows following superovulation, flushing and subsequent luteolysis with regard to conception after the individual inseminations, then the total SP reached 148.24 days. Following the first insemination cows became pregnant within 121.76 days, after the second in 155.29 and after the third insemination in 202.17 days.

From the results indicated in Table 4 follows that the earlier the superovulation and embryo removal after parturition, the quicker the return of donors to reproduction. If e.g. in cows superovulated and flushed within 60 days of calving the SP took 110.5 days, then the prolongation of the moment of superovulation and embryo recovery beyond this limit by one day prolonged the SP in group No. 2 (superovulation and recovery of embryos between the 61st and 80th post-parturition day) by 1.6 day, and in group No. 3 (recovery of embryos after the 81st day following parturition) by 2.6 days.

From Table 4 follows that the intervals between the individual fertile inseminations had various duration in the individual categories of animals and

**Table 4**  
**Influence of superovulation and of the embryo removal time on duration of the parturition-conception interval (SP) in pregnant donors**

Time of super-ovulation and removal following parturition	Number of pregnant animals and duration of the parturition-conception following the 1st - 3rd insemination									
	Total number of evaluations		After 1st insemination		After 2nd insemination		After 3rd insemination			
	Number of pregnant animals	Mean interval	Number of pregnant animals	Mean interval	Number of pregnant animals	Mean interval	Number of pregnant animals	Mean interval	Number of pregnant animals	Mean interval
Within 60 days (group No.1)	47	110.51	25	92.80	14	114.36	8	159.13		
61 - 80 days (group No.2)	33	142.97	15	119.13	10	145.10	8	185.00		
81 and more days (group No.3)	41	195.73	19	161.95	14	203.50	8	262.38		
T o t a l	121	148.24	59	121.76	38	155.29	24	202.17		

One-day delay in removal in the 61-80 day category = extension of the SP by 1.6 day

One-day delay in removal in the category of 81 and more days = extension of the SP by 2.6 days



these differences were caused among other things also by serious shortcomings in oestrus detection.

A satisfactory interval between fertile inseminations was recorded only following the conception between the first and second insemination of groups No. 1 and 2, where it roughly corresponded to the length of a single cycle (of 21, respectively of 25 days). Between the second and third fertile insemination, however, the interval was considerably longer, corresponding to the length of two cycles (44.5, respectively 40 days). In group No. 3 the interval between the first and second fertile insemination corresponded to the length of two cycles (to 41.5 days), and between the second and third inseminations even to the duration of three cycles (58.88 days). Although the extension of intervals between individual inseminations is caused by a number of factors, the fact remains that through a more accurate detection of the oestrus we could substantially reduce the intervals between the individual fertile inseminations, reducing thus the period between parturition and further conception.

Within the framework of this work we paid attention also to relations between the time of superovulation and recovery respectively between quality and utilizability of the embryos (Table 5). It appeared that most ova and embryos were acquired through superovulation in the category of animals flushed in the period up to 60 post-parturition days (6.87 per donor), while in the other two groups the recovery was 30.57 % - respectively 29.7 % lower. In group No. 2 superovulation yielded 4.77 ova and embryos and in group No. 3 4.83 ova and embryos were found per donor.

The utilization of embryos, too, was best in animals superovulated at earlier post-parturition stages. While in the category of donors superovulated and flushed within 60 days of calving there were 4.76 of utilizable embryos, in the other two groups there were only 3.27, respectively 3.21 transferable embryos per donor, which is 29.98 % and 32.57 % less. The percentage of utilizability of the embryos from the total recovery of ova and embryos did not differ too much in the individual groups, although here too, better utilizability was recorded in the category of donors flushed within 60 days following parturition (Table 5).

In one group of cows (Table 6) superovulation and embryo removal were carried out repeatedly, within a mean interval of 68.5 days. The first superovulation was performed on the 83rd day following parturition, the second on the 151st day. From the total amount of repeatedly superovulated and flushed animals 17 recipients became pregnant following 3 inseminations (80.95 %), namely 12 (57.14 %) following the first insemination, 2 (9.5 %) after the second and 3 (14.29 %) after the third insemination. The interval between second removal and conception following the first insemination was 60.82 days, after the second 84.50 days, and after the third 95.33 days. Thus the pregnant donors conceived within 72.24 days on the average.

The time between parturition and conception (SP) extended proportionally with the repeated flushing of the donors. Following the individual inseminations the cows became pregnant within 281 - 330 days (Table 6) on average within 289.53 days, i.e. they were inseminated already 56.26 days following the 2nd removal.

The results of following the influence the effect of superovulation and recovery of embryos on the milk production of the donors

Following a non-recurring superovulation and removal of embryos (Tab. 7) the impact of these activities on the milk production of the donors was studied on 239 animals. The donors were divided into three groups in a similar way as in the previous studies, i.e. according to the time of superovulation and removal of the embryos after parturition. The first group was

**Table 5**  
**Relation between the time of superovulation and embryo removal and between recovery of ova and embryos**

Time of embryo removal after parturition	Total recovery in embryos	Number of embryos per donor	Utilizability of embryos per donor out of the total number of acquired	
	Number	%	Number	%
Within 60 days	426	6.87	4.76	69.29
61-80 days	229	4.77	3.27	68.55
81-and more days	251	4.83	3.21	66.46

**Table 6**  
**Repeated superovulation in relation to the subsequent conception**

Number of cases	Mean parturition-removal interval in days		Mean interval between removals in days	Conception following the 2nd removal						Total number of pregnant	
	I. removal	II. removal		After 1st insemination		After 2nd insemination		After 3rd insemination		Number	%
				Number	%	Number	%	Number	%		
21	83	151.05	68.05	12	57.14	2	9.52	3	14.29	17	80.95
Interval between 2nd removal - conception											
				60.83	84.50		95.33		74.24		
Parturition-conception interval											
				281.75	275.00		330.33		289.53		

constituted by donors flushed within 60 days of calving, the second group included donors flushed between the 61st and 80th day after parturition, and the third group consisted of cows in which the removal of the embryo was carried out following the 81st day after parturition.

The first group consisted of 73 animals; their total milk yield was 1 889.8 kg, i.e. on the average 25.85 kg of milk per cow and day. After superovulation and embryo removal the same group of animals yielded 1867.8 kg of milk (25.58 kg per cow and day), i.e. 19 kg less, which is a drop of 0.26 kg per cow. In 38 donors (52 %) the milk yield increased following superovulation, while in 35 (48 %) there was a slight drop.

In the second group of donors superovulated and flushed between the 61st and 80th day following the parturition 71 animals were evaluated; before the embryo removal they yielded 1880.3 kg of milk, i.e. 26.48 kg of milk per donor and day. The total milk yield of the group after the flushing was 93.3 kg lower, reaching 1732 kg, i.e. 25.09 kg per cow and day. In 31 animals (43.6 %) an increase of milk yield was registered, in 40 cows (56.34 %), on the contrary, a drop averaging 1.38 kg and day (5.2 %) was registered.

In the third group flushed only following the 81st post-parturition day 95 animals were evaluated (Tab. 7). The milk yield check before the removal of embryos resulted in 2037.6 kg of milk (21.44 kg per cow), constituting a considerable drop as compared with the previous groups and corresponds to the downward character of the lactation curve. The check following the recollection of embryos yielded 1996.6 kg of milk (21.01 kg per day and cow), i.e. 41.4 kg less. 46 animals (46.31 %) showed an increase of milk yield, while in 51 cows (53.68 %) a drop in milk yield was registered, thus following the removal of embryos the milk yield was 0.44 kg lower per head (2.03 %).

On evaluating the whole set of 239 donors studied under the defined conditions of the Slušovice Agricultural Co-operative the milk yield prior to the removal of embryos was 5804.7 kg, i.e. 24.28 kg of milk per donor and day. Following the recovery of embryos and after the return of the animals to reproduction a further milk yield check resulted in 5646.4 kg (23.62 per donor and day), thus the milk yield in the group of animals as a whole dropped by 158.7 kg, i.e. by 0.66 kg per cow and day. In 113 donors (47.28 %) the milk yield following superovulation was higher, while in 126 animals (52.71 %) it was lower, dropping by 2.7 %.

## Discussion

The problem of the fertility of cows following superovulation and non-surgical recovery of embryos realized during the full milk production of the donors has not been subjected to a systematic study in the world literature, in spite of its far-reaching importance for the practical application of the transfer of embryos. Some attention was paid to the problem by G r e v e and L e h n - J e n s e n (1978), who focussed on the influence of luteolytic administered following the embryo removal (Cloprostenol 0.5 mg i.m.) to speed up the onset of oestrus and conception as compared with the not treated control group. The authors have concluded that although the luteolytic administered in the above-mentioned dosis and in close connection with the recollection of embryos had a rather positive effect on speeding up the onset of the oestrus, nevertheless the conception rate of the cows following the first insemination was much lower than that of the control group, reaching the proportion of 47.1 : 92.3 %. This fact led in the experimental group to the extensions of the superovulation-conception interval to 63.2

Table 7  
 Superovulation stimulated in various phases of the post-parturition and its impact on the milk yield of the donors

The time of stimulating superovulation following parturition	Number of examined animals	Milk yield before and after the embryo removal					
		Total milk yield before embryo removal	Total milk yield after the embryo removal in kg	Total increase in kg donors	Total drop in kg donors	Difference in kg	Mean drop per 1 donor in kg (%)
Within 60 days p.p. (group No.1)	73	1886.8	1867.8	172.7 38	191.7 35	-19	0.26 (1.0)
61-80 days p.p. (group No.2)	71	1880.3	1782.0	119.8 31	218.1 40	-98.3	1.38 (5.2)
81 and more days (group No.3)	95	2037.6	1996.6	164.4 44	205.8 51	-41.4	0.44 (2.0)
T o t a l	239	5804.7	5646.4	456.9 113	615.6 126	-158.7	0.66 (2.7)

days, while in the control animals, where oestrus started as late as 32 days following superovulation and flushing, the above interval did not exceed 53.5 days. One of the results of the low conception rate of the experimental group following the first insemination was also the extension of SP, reaching 148.2 days, while in the control group the service period did not exceed 137 days. It seems that after superovulation it is better to leave the donors without luteolytic treatment.

We arrived at similar results as Greve and Lehn-Jensen (1978) with their experimental group, when following the flushing we administered to the donors 500 µg of Cloprostenol (Oestrophan, Spofa) i.m., in a single dosis. The mean interval (Tab. 3) between embryo removal and conception varied in the whole group of animals at about 67 days; in animals superovulated and flushed within 60 days of parturition the interval was 8.5 days shorter, while in animals flushed following the 61th post-parturition day it was 4.7, respectively 5.9 days longer. The mean parturition-conception interval (148 days) in the experimental group of 162 animals also agreed with the results obtained by Greve and Lehn-Jensen (1978), but in cows superovulated and flushed within 60 days following parturition it was 37.7 days shorter, while in cows flushed after the 81st post-parturition day it was 47.5 days longer (Tab 4).

The causes of the lower conception rate in animals treated with luteolytic immediately after flushing the uterus are explained by Greve and Lehn-Jensen (1978) by the small dosis of the luteolytic, namely the dosis is not strong enough to provoke luteolysis of the superovulated ovary. The dosis perhaps provoked in most animals a late and slow drop in progesteron values, but it caused also an absence of oestrous symptoms due the insufficient creation of follicles and yellow bodies on the ovary (Schamp et al. 1977 called as the syndrom of resting period). Other consequence of low luteolytic doses was also the higher frequency of irregularities in the cycle, requiring a longer reparation period and causing low conception rate, as well as the extension of the SP (Greve and Lehn-Jensen, 1978).

Chupin et al. (1984) in a process of controlled embryo removal in cows in full lactation period with the help of Norgestromet implantate (3 mg) in combination with FSH, applied with 42 donors a considerably higher dosis of Cloprostenol. The dosis varied between 2 - 4 m.g., and it was applied i.m. following the flushing (in D<sub>7-8</sub>) approximately on the 70th day following parturition. They found that 27 (64.28%) of the donors were bulling within 6 days and 14 of them (51.9%) conceived. The remaining 15 cows had oestrus in 9 - 43 days and 7 of them (46.7%) conceived. It seems that the higher luteal reaction developing on the ovaries following the superovulation requires also a stronger luteolytic impulse. The increased doses of Cloprostrenol had therefore considerable influence also on the reproduction parameters of the superovulated donors. In 53.8% of the cows an SP shorter than 95 days was reached. Earlier without the use of luteolytic only 29% of the animals had such a short SP (Chupin et al. 1984).

According to our observations the removal of embryos after superovulation influences positively the further conception by the animals. This can be documented by comparing the conception rate of the cows following the first insemination in a normal insemination programme, with the conception rate after superovulation and embryo removal. While under normal breeding conditions the conception rate after the first insemination never exceeded 30%, after flushing the embryos 48.76% of cows conceived after the first insemination.

The donors with embryos removed in less than 60 days after parturition reached a conception rate of 53.1 % after the first insemination.

In the literature we did not find any materials dealing with the influence of superovulation on further milk production of the donors. It appears that superovulation and subsequent flushing of the uterus have little influence on the milk yield of the donors. Oscillations in lactation appearing after superovulation and after the embryo removal are usually due to stresses caused by other factors, e.g. by lengthy transportation of the animals, by hunger, thirst, etc. The drop in milk production following uterus flushing and embryo removal represented 0.66 kg per donor and day (2.7 %), and it is hard to say whether it is connected with the process of superovulation or whether it is a natural result of the drop of the lactation curve. The fears of considerable drop in the milk yield of the donors following superovulation and flushing have not been substantiated.

Our conclusions indicate that an earlier post-parturition superovulation leads to quicker return of the animals to a new reproduction cycle and therefore we do not consider as correct to extend the parturition-superovulation interval in healthy cows with physiological cycles beyond 60 post-parturition days.

#### Superovulační stimulace a odběr embryí ve vztahu k následné koncepci a mléčné produkci dárkyň

Vliv superovulace a odběru embryí po stimulaci FSH-P (Foliotropin, Léčiva Praha) na následnou koncepci dárkyň byl sledován celkem na 162 zvířatech ve věku od 3 do 12 let. Po prvních 3 inseminacích zabřezlo 121 krav (74,69 %), z nichž 59 (48,76 %) koncipovalo po první inseminaci. Nejvyšší zabřezávání po první inseminaci (53,19 %) bylo zjištěno ve skupině dárkyň superovulovaných do 60 poporodních dní.

Dárkyně v průměru zabřezávaly za 67,6 dní po odběru embryí a zvířata superovulovaná do 60 dní po porodu koncipovala za 59,1 dne po odběru embryí.

Průměrná service perioda sledovaných dárkyň dosahovala 148 dní, ale u zvířat superovulovaných do 60 poporodních dní nepřesáhla 110 dní.

Srovnáním mléčné produkce jeden měsíc před a po superovulaci bylo zjištěno, že rozdíl v nádoji byl minimální a pohyboval se kolem 0,66 kg na dárkyň a den.

#### Суперовуляционное стимулирование и отбор эмбрионов по отношению к последующей концепции и молочной продукции

Влияние суперовуляции, вызванной FSH-P, на последующую концепцию доноров исследовали на 162 животных, из числа которых 121 (74,69 %) забеременело после трех последующих осеменений; 59 из них (48,76 %) было оплодотворено после первого осеменения. Самое большое забеременение после первого осеменения (53,19%) наблюдалось у суперовулированных коров в течение первых 60 послеродовых суток.

Доноры в среднем оплодотворялись через 67,6 суток после отбора эмбрионов, суперовулированные коровы - до 60 суток после отела забеременели через 59,11 суток. Средний сервисный период достигал 148 дней, у суперовулированных коров до 60 послеродовых

дней не превышал 110 суток.

В ходе исследования молочной продукции до и после супероуляции и отбора эмбрионов выяснилось, что на молочную продукцию по сути дела не оказано никакого влияния. Средняя разница удоя у экспериментальной группы не превышала убыль 0,66 кг на донора и сутки.

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