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INFLUENCE OF CYCLE STIMULATION IN WEANED SOWS ON FERTILITY DEPEND ON SEASON

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Invited paper

Abstract: In summer high temperatures are stress for sows mostly. This situation often affects the reproduction physiology in animals strongly. As a result of that the fertility and reproduction performance of sows can be reduced. High environmental temperatures and especially heat accumulation in body of the animals affect the metabolism in high performance sows. That is important in very sensitive phases in reproduction cycle of sows like heat, pregnancy and lactation. Young sows (gilts and primiparous sows) are more sensitive than older sows. This situation demands zoo- and biotechnical activities expecting assistance for reproduction endocrinology in sows. Regarding this aim, the stimulation of cycle with eCG in weaned sows with different age was investigated. Following results were found:

The effect of cycle stimulation with 800 IU eCG in weaned sows differ depend on age of sows, season and temperature.

Cycle stimulation with eCG in summer (July, August, September) reduces risk of low fertility in sows.

In other seasons the positive effect of biotechnical cycle stimulation is not clear generally.

Especially in primiparous sows there is a positive effect of biotechnical treatment in summer.

In older sows in 3rd to 5th litter the cycle stimulation has no significant positive effect on fertility.

In sows with more than 5 litters cycle stimulations are necessary to save a high reproduction performance generally.

Key words: sows, cycle stimulation after weaning with eCG, season, temperature age of sows, fertility, reproduction performance

Introduction

In pig industry the production of piglets have to be continuously all over the year. In front of this background the reproduction performance of sows must be in the same high level all over the year. In the last years the reproduction performances increased strongly. Today the reproduction performance of sows is more than 27 weaned piglets per sow and year. In the average, the genetic potential is about 32 live born piglets per sow and year. The number of born alive piglets is influenced by numerous factors, however only some of them can be precisely determined and recorded under production conditions. Effects such as farrowing number, age at farrowing, breeding season, length of previous lactation, or duration of the period from weaning to breeding, are parameters regularly recorded when monitoring sow fertility under all production conditions. Contrary to previously mentioned effects, effects such as housing, nutrition, diseases, or effects of boar are very rarely recorded, even though they influence the variation of number of born alive piglets to a considerable extent *(Kosovac et al., 2005; Bößenrodt and Fischer 2005; Radojković et al., 2007)*.

Following parameters are very important for realization of these results: number of born alive and weaned piglets per litter, pregnancy rate after first insemination, uniform and health piglets in each litter. After weaning sows come in heat after a short time when all environmental influences are optimal, like temperature, feeding housing conditions, climate, no stress. Additionally the body conditions of sows have to be in optimal level.

Very often 24 hours after weaning sow get an injection of 800 IU of eCG for stimulation onset of estrus and to stimulate follicle growth. After this treatment the onset of estrus is sure and the number of growing follicles can be increased a little bit. Following the litter size can be increased too *(Schnurrbusch and Hühn, 1994)*.

A special situation is in summer time. In summer high temperatures are stress for sows mostly. This situation often affects the reproduction physiology in animals strongly. As a result of that the reproduction performance of sows can be reduced. High environmental temperatures and especially heat accumulation in body of the animals affect the metabolism in high performance sows.

That is important in very sensitive phases in reproduction cycle of sows like heat, pregnancy and lactation. There are some important consequences of high temperature on fertility in high productive sows:

Delayed onset of puberty
Change in estrous behaviour
Reduced pregnancy rate
Reduced litter size
More miscarrieages and stillbirth (mummies)

All together, there are high variations in seasonal reproduction performances between herds and farms. Young sows (gilts and primiparous sows) are more sensitive than older sows (Figure 1).

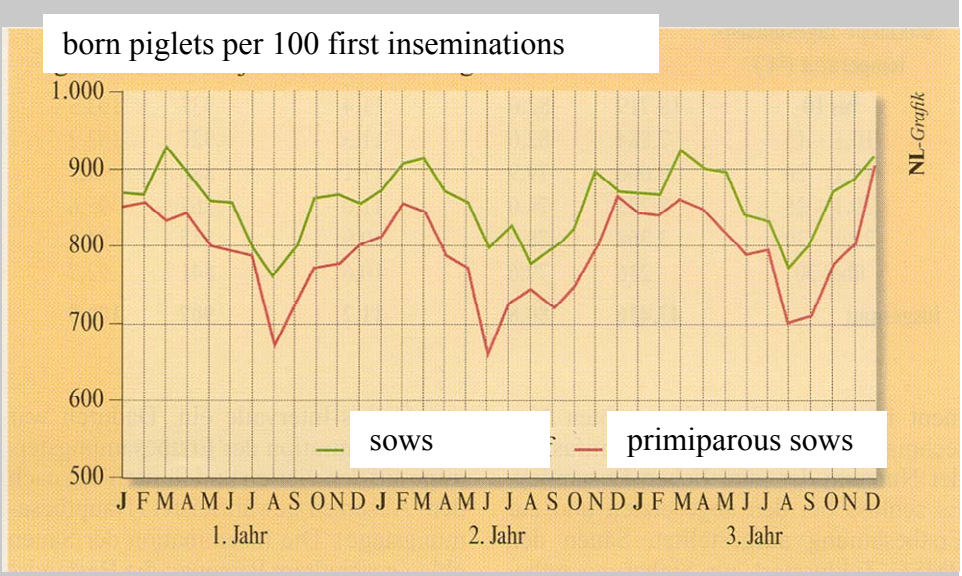

Figure 1. **Saisonal variations in fertility in sows**

This situation demands zoo- and biotechnical activities expecting assistance for reproduction endocrinology in sows. Regarding this aim, special biotechnical methods have been adapted and modified to special and individual situations in farms. Regarding this situation the aim of the investigation was following:

Qualification of influence of modified biotechnical treatment for cycle stimulation during different seasons.

Analyzing the effect of biotechnical treatment for stimulation of estrus on estrous behaviour and fertility in sows.

Is there a difference between primiparous and pluriparous sows?

Materials and Methods

In a large pig farm with 1000 sows the results of reproduction performances of sows were analyzed. Sows were divided in experimental group with biotechnical treatment (1000 sows) and control group without biotechnical

treatment (1093 sows). Sows in experimental group have got following biotechnical treatment for cycle stimulation (Figure 2).

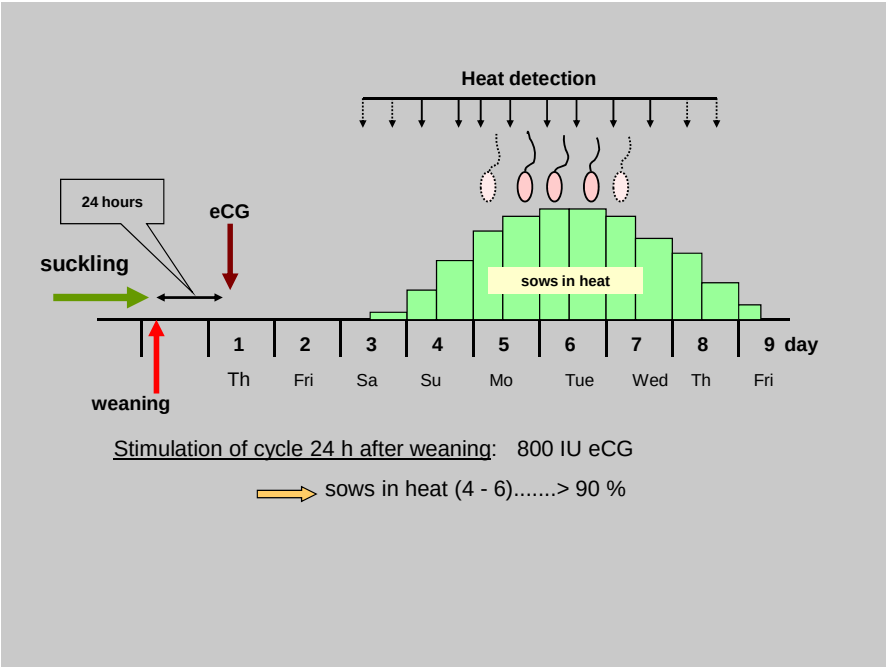

Figure 2. Stimulation of cycle after weaning in sows

Sows in control group haven't got biotechnical treatment. Following parameters were analyzed:

Estrous behaviour

Fertility and reproduction performance of sows in control group and experimental group

Analysis of the seasonal differences in fertility of sows

Analysis of the influence of age of sows

Results and Discussion

In sows of both groups have no differences in estrous behaviour (Table 1).

Table 1. Influence of cycle stimulation with eCG on estrous behaviour and reproduction performance of weaned sows

	Without cycle stimulation control group	With cycle stimulation experimental group
Number of sows (AI) – total	1093	1000
Number of sows in heat (AI) – (%)	968 (88.56%)	898 (89.80%)
Number of litters	811	734
2^{nd} litter	182	147
3^{rd} – 5^{th} litter	395	354
$>5^{th}$ litter	234	233
Parturition rate litters /number of sows in heat %	83,78	81,74
Alive born piglets / litter n	12,16	12,10
Alive born piglets/100 first inseminations n	1019	989

Both pregnancy rate and litter size of sows in both groups were in the same level. There is no significant difference between index "born alive piglets per 100 first inseminations" in control and in experimental group.

With regard to the aim of investigation the results in the different months and seasons were concluded. Additionally the average of temperature in the days and months were registered.

In winter with low temperature there was no significant difference in estrous behaviour between sows of both groups (Figure 3).

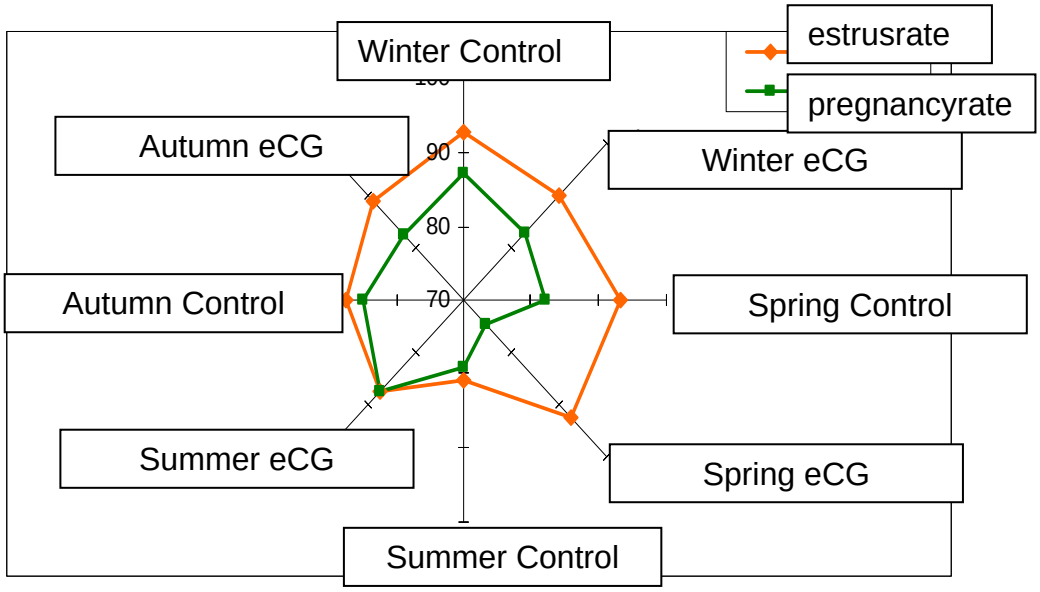

Figure 3. Influence of cycle stimulation in weaned sows on estrus and pregnancy rate depend on season

In summer with high environmental temperatures there was a significant difference in estrous behaviour between sows without cycle stimulation and sows in experimental group. In summer in experimental group the relation of sows in heat was higher then in control group. Pregnancy rate of sows in both groups differed in summer significantly too. Still *Hendel and Elze (1984)* confirmed fertility leg in summer with high temperature. Especially in July and August there in sows of control group the fertility was reduced strongly. The average temperature was 23,1degree Celsius. The effect of biotechnical stimulation of estrus in weaned sows the fertility leg was not strongly. *Hühn and Henze (1984, 2000), Hühn (2002)* and *Wähner (2006)* confirmed the fertility leg in in summer. They observed lower pregnancy rates und smaller litter sizes.

In sows of experimental group the litter size was about 1.6 piglets per litter increased compared to sows in control group (Figure 4). Especially in August the difference was very high, 1.5 piglets per litter more in sows in experimental group then in sows of control group.

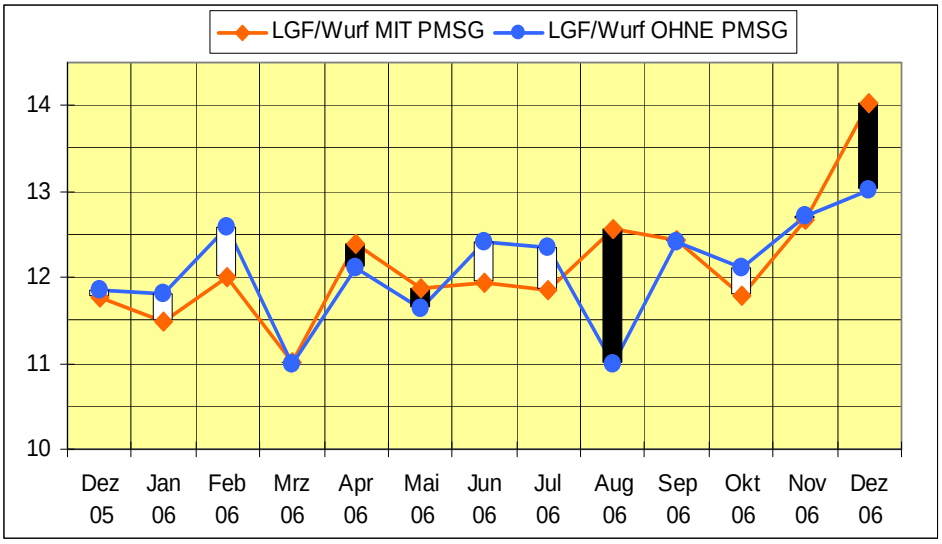

Figure 4. Influence of cycle stimulation in weaned sows on born alive piglets depend on season

Generally, the index "Alive born piglets per 100 first inseminations" is a very useful parameter. It contains both the pregnancy rate and the litter size. In comparison to sows of experimental group in summer (July, August, September) the sows of control group realized a reduced number of born alive piglets per 100 first inseminations (Figure 5).

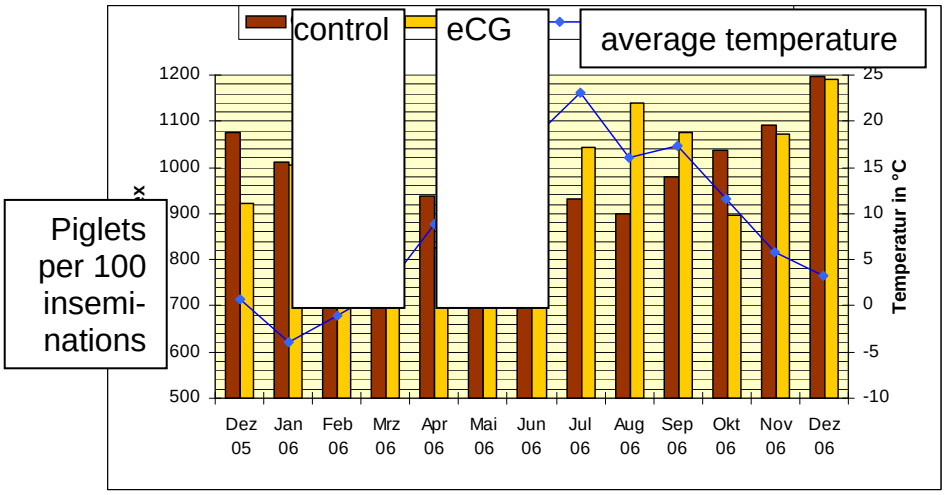

Figure 5. Influence of cycle stimulation in weaned sows on "Alive born piglets per 100 first inseminations" in weaned sows depend on season

Conclusion of these results is following: Only in summer with high temperature it is necessary to stimulate the cycle in weaned sows to realize a high reproduction performance.

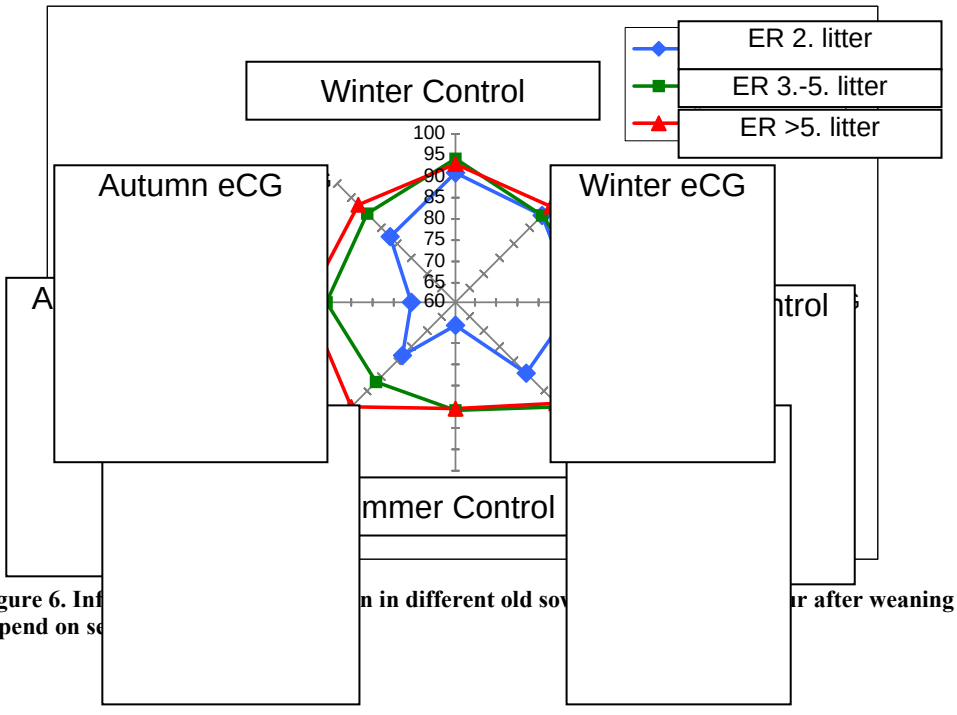

Figure 6. Inf n in different old sov r after weaning depend on se

Additionally it is very important to know the special reaction of different old sows on biotechnical stimulation of cycle depend on season. Picture 6 showes the effect on relation of sows in heat.

Barbe (1996) confirmed, in primiparous sows without eCG stimulation of cycle after weaning the onset of estrus is delayed compared to pluriparous sows and to sows with biotechnical treatment. In present investigations these results were confirmed once more. Generally, in summer in primiparous sows the onset of estrus after weaning is much more sure when sows have received biotechnical cycle stimulation with 800 IU eCG. In others seasons a biotechnical treatment is not necessary.

Figure 7 shows the percentage of farrowed sows depending on season. In winter, spring and autumn there are different results. In winter primiparous sows without biotechnical treatment have realized a significant higher farrowing rate then sows with eCG cycle stimulation. In spring very old sows realized the highest farrowing rate. In summer there is a positive effect of biotechnical stimulation in all sows, but there is a significant positive effect in primiparous sows.

Table 2 contains the results of born alive piglets per litter in different old sows depend on season and biotechnical treatment. In winter and spring there were no difference between litter size of sows with 3 to 5 litters in control group and sows in experimental group. In summer the number of born alive piglets per litter in sows after biotechnical treatment was increased by about 1 piglet significantly compared to sows in control group. In the other hand in autumn the sows with 3 to 5 litters without biotechnical treatment realized significant higher litter sizes than sows in experimental group.

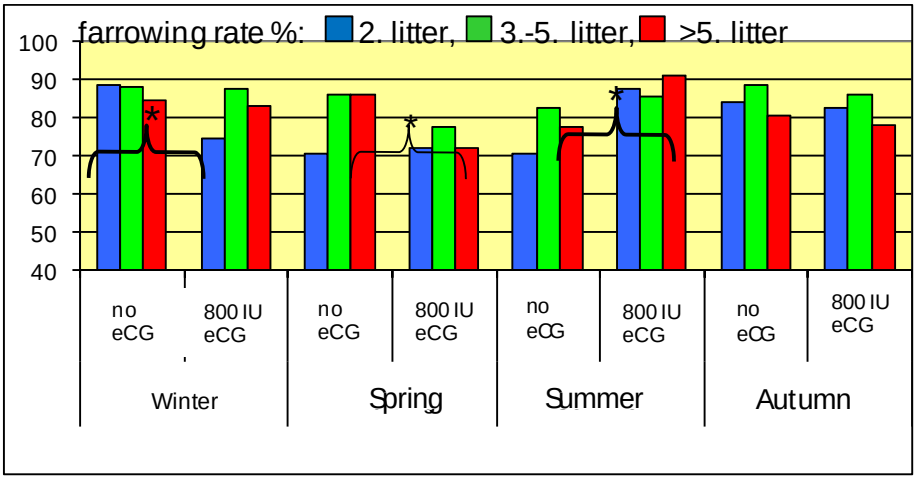

Figure 7. Influence of cycle stimulation on farrowing rate in different old sows depend on season

Table 2. Influence of cycle stimulation after weaning in different old sows on born alive piglets per litter depend on season

	Winter		Spring		Summer		Autumn	
	Control n=218	800 IU eCG n=164	Control n=179	800 IU eCG n=184	Control n=143	800 IU eCG n=192	Control n=271	800 IU eCG n=194
2. litter	12.44	11.47	11.45	11.42	12.21	12.29	12.08	13.21
3.-5,litter	12,27	12.32	12.11	12.20	12.27	13.24	13.36	13.00
>5. litter	11.35	11.27	11.15	10.94	10.97	10.97	11.69	12.17

The index "born live piglets per 100 inseminations" demonstrates the positive effect of biotechnical treatment in sows during high temperature time in summer clearly (Table 3). This effect was observed in all sows, independent of the age of sows.

Table 3. Influence of cycle stimulation after weaning in different old sows on "born alive piglets per 100 first inseminations" depend on season

	Winter		Spring		Summer		Autumn	
	Control n=218	800 IU eCG n=164	Control n=179	800 IU eCG n=184	Control n=143	800 IU eCG n=192	Control n=271	800 IU eCG n=194
2. litter	1099	855	806	820	862	1072	1013	1088
3.-5,litter	1081	1078	946	946	1009	1131	1183	1118
>5. litter	958	936	788	788	850	997	942	948

Conclusion

Following conclusions are possible:

The effect of cycle stimulation with 800 IU eCG in weaned sows differ depend on age of sows, season and temperature.

Cycle stimulation with eCG in summer (July, August, September) reduces risk of low fertility in sows.

In other seasons the positive effect of biotechnical cycle stimulation is not clear generally.

Especially in primiparous sows there is a positive effect of biotechnical treatment in summer.

In older sows in 3rd to 5th litter the cycle stimulation has no significant positive effect on fertility.

In sows with more than 5 litters cycle stimulations are necessary to save a high reproduction performance generally.

Uticaj stimulacije ciklusa na plodnost odlučenih krmača u zavisnosti od sezone

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Rezime

Letnje visoke temperature su najviše stresne za krmače. Ova situacija često snažno utiče na fiziologiju razmnožavanja životinja. Kao rezultat toga plodnost i reproduktivne osobine krmača mogu biti umanjene. Visoke spoljašnje temperature a posebno sakupljanje toplote u telu životinja utiču na metabolizam i značajne osobine krmača. Ovo je važno u veoma osetljivim fazama reproduktivnog ciklusa krmača kao što su toplota, bremenitost i laktacija. Mlade krmače (nazimice i prvopraskinje) su osetljivije od starijih krmača. Ova situacija zahteva zootehničke i biotehničke postupke kao očekivanu pomoć u endokrinologiji reprodukcije krmača. Povodom ovog cilja ispitivana je ciklična stimulacija odlučenih krmača različitog uzrasta eCG-om. Dobijeni su sledeći rezultati:

Uticaj ciklične stimulacije odlučenih krmača sa 800 i.j. eCG-a različit je u zavisnosti od uzrasta krmača, sezone i temperature.

Stimulacija ciklusa eCG-om u letnjim mesecima (jul, avgust, septembar) umanjuje rizik od niske plodnosti krmača.

U ostalim sezonama pozitivan uticaj biotehničke stimulacije ciklusa nije potpuno jasan.

Posebno kod prvopraskinja se ispoljava pozitivan uticaj biotehničkog tretmana u letnjem periodu.

Kod starijih krmača, od trećeg do petog prašenja, ciklična stimulacija nema značajan pozitivan uticaj na plodnost.

Kod krmača sa više od 5 prašenja ciklična stimulacija je neophodna da bi se sačuvala visoka reproduktivna sposobnost.

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