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EFFICIENCY OF DIFFERENT METHODS TO SYNCHRONIZE THE OESTRUS IN ARTIFICIALLY INSEMINATED, LACTATING DOES

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ABSTRACT

Two batches of 80 does each were artificially inseminated (AI) 11d post parturition during 10 months in order to judge the effect of a synchronisation of the oestrus. The following methods were compared with non-treated controls: a 24h doe-litter separation: injection with a vitamin complex and selective use of PMSG (only does with pale vulva were treated two days preceding AI). Neither 24-h separation nor injection with a vitamin complex improved fertility (FR). Selective use of PMSG resulted in a non-significant 4.3% improvement of the FR compared to the controls (72.9 vs 68.6%). However, based on observation of the vulva colour, 35% of the does lose their receptivity between day 9 and 11 post parturition. As a consequence, their FR is reduced (56%). A systematic treatment with a vitamin complex two days preceding the AI seems to improve the condition because a significantly higher weight of the doe and her young at weaning was observed.

INTRODUCTION

In commercial rabbit meat production, the combination of artificial insemination (AI) and management in a batch system is widely used and has replaced natural mating. However, in such systems the success of AI depends largely on the synchronisation of oestrus (THEAU-CLÉMENT et al., 1998). The irregularity of the oestrus cycle, especially during the lactation period, necessitates a method to synchronise sexual receptivity of the does on the intended AI day. This was recently stressed by RODRIGUEZ DE LARA and FALLAS (1999).

In the past few years many studies have been carried out to find alternative methods to systematic hormonal (PMSG) induction of oestrus (PAVOIS et al., 1994; THEAU-CLÉMENT and BOITI, 1998; BONANNO et al., 1999a,b; VIRAG et al., 1999; SZENDRÖ et al., 1999; THEAU-CLÉMENT and MERCIER, 1999; DUPERRAY et al., 1999). Doe-litter separation has been shown to improve the reproductive performance of does during the lactation period. However, the results concerning the optimal duration of the separation are not consistent in the aforementioned reports. Moreover, a 40h separation could be criticised in view of animal welfare.

On the insemination day, BONANNO et al. (1996) treated the non-receptive does of the batch with PMSG and then inseminated them three days later. Such a moderate use significantly

increased the fertility rate but requires AI on two separate days which is unpractical. Treatment of the non-receptive does two days prior to the intended date of AI for the batch can overcome this problem.

The end of the pregnancy and the ensuing lactation has an exhausting effect on the doe. That is why some pharmaceutical companies promote the use of an injection with vitamins, oligo elements and/or protein with high biological value (QUALTECH, 1993). An improvement of certain physiological functions in early lactation could help to overcome the antagonism between lactation and the reproductive function.

The objective of our experiment was to compare the efficacy of three methods of inducing the oestrus and their effect on the reproductive performance of does.

MATERIAL AND METHODS

Experimental conditions

The experiment was performed in one of the experimental stables of the Institute of Small Animal Husbandry between May 1997 and April 1998. Initially 160 does, belonging to the Institute's own selected strain (MAERTENS, 1992), were divided into 4 homogeneous groups, taking into account their physiological status and parity at the beginning of the experiment. Each doe was definitively assigned to a treatment. Discarded does (mortality, illness, sore hocks, two consecutive infertile inseminations or low productivity) were immediately replaced by nulliparous ones.

A 42 day reproduction rhythm was followed using artificial insemination. The does were divided into two batches, which were inseminated with an interval of 21 days. Non-pregnant does changed from batch at weaning and were re-inseminated together with their new batch. Because weaning was performed at day 29-post parturition (PP), the non-pregnant does were re-inseminated 3 days after weaning.

Housing, breeding, management and artificial insemination were comparable with a former experiment were described in detail by MAERTENS (1998). During the experiment, does were fed *ad libitum* a standard reproduction diet prepared at the Institute with the following composition: 17.5% CP; 15,5% CF; 4.2% crude fat and 9.8 MJ ME/kg.

Experimental treatments:

A. Control: no oestrus synchronisation

B. Selective use of PMSG: only does with pale vulvas were treated with 20 IU (Folligon, Intervet) two days before the AI

C. Separation of doe-litter by closing the nestbox during 24h before AI

D. Treatment with a vitamin complex (Cofalysor®, 1ml SC/kg LW) two days before AI

Cofalysor® is a fish hydrolysate enriched with vitamins (B1, B2, B6, B12) and minerals (K, Mn and Fe).

No systematic controlled lactation was performed. Nestboxes were closed (treatment C) between 8:00 and 9:00 am and these does were allowed to nurse the next day between 8:00 and 9:00 am. All AI were performed between 9.30 and 11.00 am.

Recorded parameters

Receptivity of all does was judged based on vulva colour and turgency just before insemination and also two days before the insemination in the PMSG group. Parity number and type of insemination (first or re-insemination) were recorded. Palpation was performed 14d-post insemination. However, fertility rate was determined on does having litters including females that were pregnant at autopsy. Litter size was checked within 14-h post parturition. Does and their litters were weighed at parturition and also at 7, 11, 21 and 29 days PP. Day 31 post insemination was considered as fixed parturition day for all does.

Statistical analyses

Only inseminations performed on lactating does were considered for evalaution of reproductive performance. A total of 1098 inseminations were used for variance analysis (ANOVA, SPSS). The linear model included the treatment and the effects of parity, insemination group, and the interactions. The preliminary analysis did not reveal significant interactions and they were ignored in the final analysis. Means were compared using the LSD test of Fisher. Results presented are least square means.

RESULTS AND DISCUSION

In Table 1, an overview of the results is presented. Average fertility rate (FR) obtained with lactating does was 69.4%. Differences in FR between treatments were not very pronounced. Does systematically treated with a vitamin complex had the lowest FR. The treatment with a selective use of PMSG resulted in a non-significant 4.3% improvement of the FR. However in this group, the difference in FR was more pronounced between AI with a preceding PMSG treatment or not: 69.7 and 76.3%, respectively. BONANNO et al. (1996) obtained an even larger improvement in lactating does.

Table 1. The effect of oestrus stimulus on the reproductive performance of lactating does.

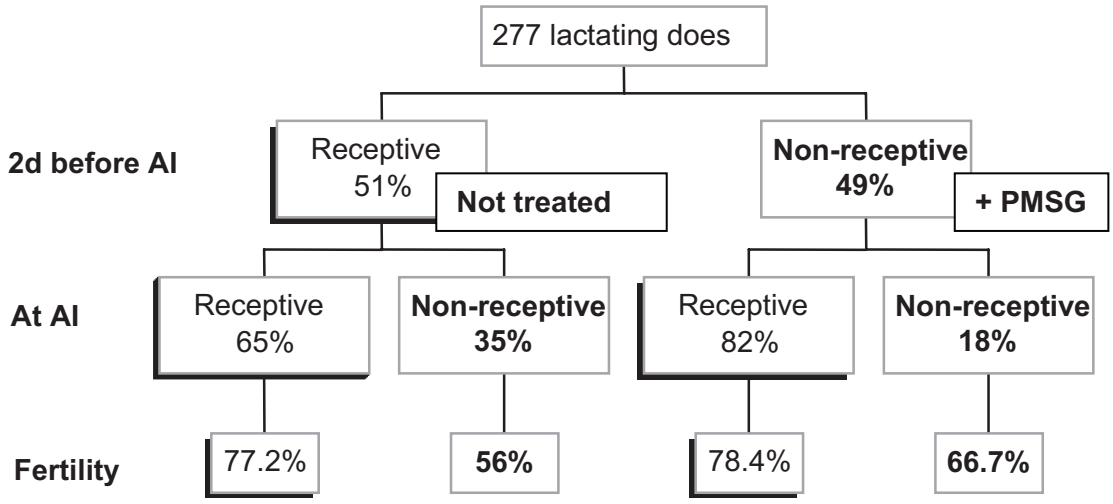
	Treatment				Prob.
	Controls	Selective PMSG	24h doe-litter separation	Vit. Injection	
N° of AI	258	277	290	264	-
Fertility (%)	68.6 ^{ac}	72.9 ^{ab}	70.0 ^{ac}	65.9 ^{c}	P<0.05
Born /litter	7.5 ± 0.3 ^{a}	8.6 ± 0.4 ^{b}	8.2 ± 0.2 ^{bc}	7.8 ±0.3 ^{ac}	P<0.01
Adjusted/litter	8.0	7.9	7.9	7.9	NS
Weaned/litter	7.5	7.3	7.5	7.3	NS

Means with differing superscripts in a row differ significantly (P<0.05)

A 24h doe-litter separation only very slightly improved FR (+1.4%). This agrees with the results obtained by ALVARINO et al. (1998) but not with THEAU-CLÉMENT and MERCIER (1999) who observed a significant (+12.6%) increase in FR with this method although controls already had very good FR (82.3%).

A selective use of PMSG significantly increased the litter size. This effect was only seen with the PMSG treated does, which had a litter size of 9.4 kits. Such a response to a PMSG treatment has been demonstrated in many experiments (CASTELLINI, 1996). Although there was a lack of response in FR, the 24h doe-litter separation resulted in an increased ($P<0.05$) litter size. Again the vitamin treatment had no positive response on initial litter size.

Fig. 1. Receptivity and fertility in the PMSG group



In Figure 1, detailed results are presented concerning the receptivity and fertility in does selectively treated with PMSG. Two days before insemination, only 51% of these lactating does showed oestrus signs. About 1/3 of these does (35%) were not more receptive at the moment of AI. The FR of these does was reduced to 56%. Does that did not show oestrus signs were treated with PMSG. Two days later, 82% had coloured vulvas and their fertility was 78.4%.

This partly explains the moderate effect compared with the results of Bonanno et al. (1996). Based on our work, oestrus signs two days preceding AI do not guarantee that does will still be receptive two days later. BONANNO et al. (1996) on the contrary, inseminated the receptive does immediately while the non-receptive does were treated with PMSG and inseminated 72h later.

Average weight of does at insemination was higher ($P<0.05$) when they were systematically treated with a vitamin complex (Table 2). Also their young were heavier at 21 days of age and at weaning. This indicates the possibility of an effect on the condition of the does although no response was observed on their reproductive performance. However, initial weight of does was not taken into account when does were assigned to their treatments.

Table 2. Weight of the lactating does and their young

Weight	Treatment				SEM	Prob.
	Controls	Selective PMSG	24h doe-litter separation	Vit. Injection		
of does at AI (g/doe)	4 210 [a]	4 224 [a]	4 121 [b]	4 330 [c]	78	P<0.01
of young (g/kit) at						
7d of age	152	155	153	156	7	NS
11d of age	217	223	224	222	10	NS
21 d of age	374 [a]	381 [ab]	375 [a]	389 [bc]	16	P<0.01
at weaning	667 [a]	680 [ab]	677 [ab]	694 [bc]	25	P<0.01

Means with differing superscripts in a row differ significant (P<0.05)

Based on this experiment the following conclusions can be draw:

- A 24h doe-litter separation is not long enough to have a synchronising effect on the oestrus of lactating does.
- An injection with a vitamin complex does not favour the reproductive performances but the condition of does and their young seem to be improved.
- Finally, a selective treatment with PMSG of the non-receptive does has only a minor effect on the fertility results of the batch. Oestrus signs two days preceding AI do not guarantee that the does will still be receptive at the time of insemination.

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