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RECEPTIVITY OF THE RABBIT DOE: WHICH METHODS THAT COULD BE PREDICTIVE FOR RECEPTIVITY

ABSTRACT

The aim of this study was to exam sexual receptivity in rabbit does at the day of artificial insemination using the colour of vulva, rectal temperature and vagina cytology by the percentage of keratinized cells. A total of 36 multiparous INAT does were used for this purpose and they were injected with PMSG before artificial insemination (AI). 48 hours after injection, does detected receptive, were inseminated (1st AI). The remained does were inseminated 72 hours after PMSG injection, when they were considered receptive (2nd AI). For each group of does, the artificial success rate was determined at the 1st AI and the 2nd AI. The result showed that the higher success rates at the 1st AI and 2nd AI was found for red and pink vulva (respectively 100 and 40% for the 1nd AI and 100 and 33 for the 2nd AI), and when rectal temperature >38°C (100 and 33 % respectively for the 1nd AI and the 2nd AI), and when the percentage of keratinized cells vagina >50% (83 and 50 % respectively for the 1nd AI and the 2nd AI). The results study showed also that treatment with PMSG has not been efficient for all the rabbit does to induce receptivity 48 hours after the injection. We conclude that the colour of vulva is the best method to use to predict receptivity of INAT rabbit does treated with PMSG. Nevertheless, this treatment to induce receptivity was not effective for all multiparous INAT does at the first artificial insemination.

Key words: receptivity, artificial insemination, success rate, doe

1. INTRODUCTION

Receptivity is an important parameter to predict fertility and production of the rabbit doe. But, this parameter is hard to be detected because of incompatibility with cycled production (1, 2). Thus, in industrial rabbit farm, oestrus synchronisation based on PMSG injection is compulsory (3) and improves receptivity and increases the pregnancy rate (4, 5). Receptivity of rabbit doe is related to the ovary status which contains at this stage a large number of follicles and a high level oestrogen. This one affects the colour of the vulva which is the most method used in industrial rabbit farm to detect if the doe is receptive or not (6). For some doe colour of the vulva is not usually indicative of oestrus stage (7). That's why finding other methods which can be more predictive for doe receptivity are alternatives to well estimate the oestrus stage of the doe. The aim of this study was to investigate the efficacy of 3 methods of detection of the receptivity in the doe, which are colour of vulva, rectal temperature and vagina cytology; and to determine which method that can be more predictive for doe receptivity.

2. MATERIAL AND METHODS

2.1. Animal:

The experience took place in the experiment facility of the National Institute of Agronomy of Tunisia in April. The study was carried on 36 INAT rabbit does aged 9 months. During the experience, each rabbit was housed in an individual cage and received food maternity kind. The rabbit does were multiparous and out of lacting.

2.2. Methods to detect the receptivity:

The receptivity of does was evaluated by three methods:

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Colour of the vulva: It was determined just before the artificial insemination by simply vulva examination. We were interested to look for the presence of red or pink which indicated receptive rabbit, and purple or white which indicated non receptive rabbit.

Rectal temperature: it was determined by a digital thermometer inserted in the rectum of the doe for 2 minutes just before the artificial insemination.

Vagina cytology: The cytology of the vagina of does was studied by the percentage of keratinized cells. This later was determined by a smear preparation just before the artificial insemination according to Ola and Oyegbade (8). This involves separating the labia, after that we insert the tip of a cotton swab into the vagina of the rabbit; we gently wipe the vaginal wall by turning the end of the cotton swab in one direction. Then, we gently spread the end of the cotton swab on the blade and the methanol was spread along the blade using a micropipette. Then, it was let rest for a few seconds to allow the fixing of the cells. In the end, the dye eosin-nigrosin along the blade was spread and allowed to rest for a few seconds. The smear was examined under an optical microscope at a magnification of x 40. The smear shows the existence of two types of cells: small cells characterized by the presence of a nucleus indicating the state of anoestrus rabbits and large cells characterized by the absence of core indicating the state of estrus rabbits. A sample of 100 cells is counted on different random fields of the smear.

2.3. Artificial insemination:

Artificial insemination (AI) was performed using the vertical method with a syringe with a bent shaft at the end (9). The number of sperm within a dose of AI had an average of 50 millions. The semen used in the artificial insemination was collected from INAT bucks and was considered having satisfactory quality. Immediately after artificial insemination, each doe received an intramuscular injection of GnRH (0.2 ml) to induce ovulation. The doe received also 48 hours before artificial insemination an intramuscular injection of PMSG (25 IU) to induce follicular growth. At the day of insemination (1st AI), the colour of vulva, rectal temperature and the percentage of keratinized cells were determined and for the does that had been receptive the AI was performed. For does that had been not receptive, an insemination (2nd AI) was performed at 72 hours after PMSG injection when the colour of vulva was red or pink.

Fourteen days after artificial insemination, pregnancy diagnostic was performed by hand palpation. Finally, the success rate of artificial insemination (%SAI) was calculated by (number of pregnant rabbits/ total insemination) x 100 for each method of receptivity.

2.4. Statistical analysis:

Data were analysed by Statistical Analysis System (SAS Institute Inc., Cary, NC, USA). The Chi square test was used to compare between methods of receptivity.

3. RESULTS AND DISCUSSION

The results showed that after treatment with PMSG, only 33% and 60% of rabbits presented red vulva and 40% presented pink vulva at the 1st and 2nd artificial insemination. Consequently, the highest artificial success rates were obtained in the group of rabbit with red and pink vulva compared to those having purple and white vulva (Table 1).

The 1st and 2nd artificial success rate were higher for rabbits which had rectal temperatures >38°C (100 and 33 % when rectal temperature >38°C *vs* 20 and 14 % when rectal temperature ≤38°C; Figure 1).

The 1st and 2nd artificial success rate were higher for rabbits which had for rabbits having percentage of keratinized cells vagina >50% compared to those having percentage of keratinized cells vagina ≤50% (83 and 50% *vs* 0%; Table 2).

Our results showed that the highest artificial insemination success rate was obtained when the colour of vulva was red (100%), the rectal temperature >38°C (100%) and percentage of keratinized >50% (83%). Therefore, we can say that among studied methods to determine receptivity, the colour of the vulva stills the more efficient and quickest method to predict receptivity of the doe. In fact, Martens et al. (10) reported that colour and turgidity of the vulva were the best indicator of the receptivity in rabbit doe treated with PMSG. But, Boiti et al. (7) said that receptivity can be better detected by behavioural test in the presence of vasectomised buck. Moreover, in another study, Boiti et al. (11) reported that does having red vulva were sexually receptive and those having white vulva never accepted the mating with bucks. Klass (12) studied cytologic changes of stages on canine oestrous cycle, reported that vaginal cytology is almost always a better predictor of the fertility and the pregnancy rate. Besides, Tsiligianni et al. (13), in their study in select rabbit does to superovulation, found that cytology of vaginal smears may help to predict success of superovulation does.

Our study showed also that treatment with PMSG has not been efficient for all the rabbit does to induce receptivity 48 hours after the injection (33 and 40 % of receptive does based on the colour of the vulva). It could be related to the period of the study which took place in April. Alfonso and Pagés-Mantè (4) found that the highest percentage of receptive does was noted in October. Besides, Theau-Clément et al. (14) reported also that receptivity and thus fertility of does decrease when environnemental temperature increased. However, Dimitrova et al. (15) in their trail on both nulluparous and multiparous rabbit does, found that PMSG treatment was not necessary.
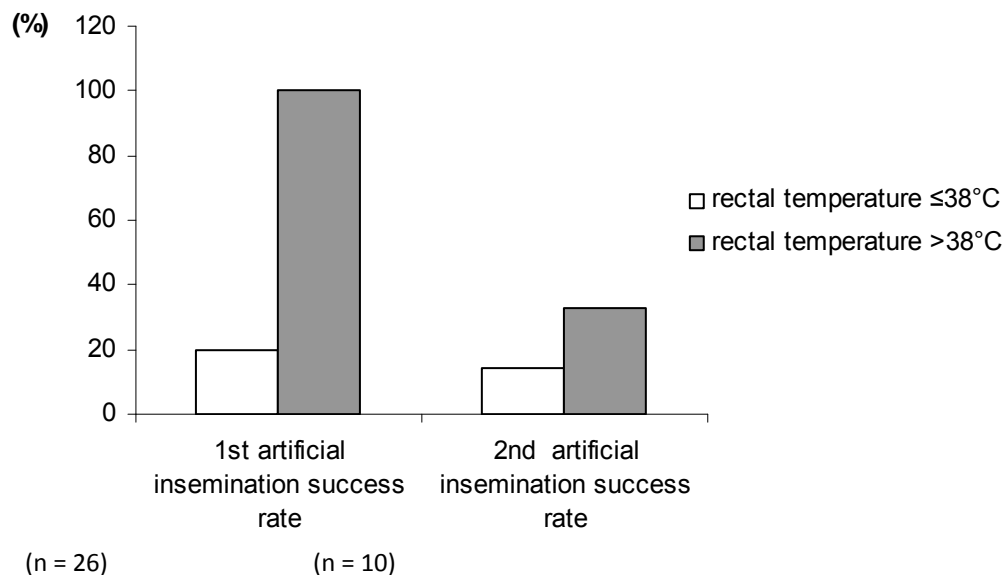

Figure 1: artificial insemination success rate according to rectal temperature of rabbit

Colours vulva	Red	Pink	Purple	White
1st AI (n = 25)				
Percentage of rabbit having coloured vulva (%)	33	40	7	7
AI success rate (%)	100	67	0	0
2nd AI (n = 11)				
Percentage of rabbit having coloured vulva (%)	60	40	0	0
AI success rate (%)	100	33	0	0

AI success rate: artificial insemination success rate

Table 1: Artificial success rate according to rabbit colour vulva.

	%KC ≤ 50%	%KC > 50%
Percentage of rabbit having percentage of KC >50 %	48	52
1st artificial success rate (n = 26)	0	83
2nd artificial success rate (n = 10)	0	50

%KC: percentage of keratinized cells vagina

Table 2: Artificial insemination success rate according to the percentage of keratinized cells vagina.

4. CONCLUSION

In conclusion, our results showed that the colour of vulva is the best method to use to predict receptivity of INAT rabbit does treated with PMSG. Nevertheless, this treatment to induce receptivity was not effective for all multiparous INAT does at the first artificial insemination.

5. REFERENCES

1. Theau-Clément M. Preparation of the rabbit doe to insemination: a review. World Rabbit Sci 2007; 15:61-80.
2. Theau-Clément M, Lebas F, Boiti C, Breecchia G, Mercier P. Influence of different eCG doses on sexual receptivity and productivity of rabbit doe. World Rabbit Sci 2008; 16: 65-72.
3. Theau-Clément M, Boiti C. Biostimulation methods for breeding rabbit does: synthesis of the first results. World Rabbit Sci 1998 ; 6(1): 205-208.
4. Alfonso A, Pagés-Mantè A. Efficacy of two gonadotrophins on receptivity of commercial does. World Rabbit Sc 2002; 10(3): 99-102.

5. Rebollar PG, Milanés A, Esquifino AI, Millan P, Lorenzo PL. Plasma oestradiol and prolactin in synchronized multiparous rabbit does. Proceedinds of 8th World Rabbit Congress, September 7-10, 2004; Puebla, Mexico, 330-335.

6. Castellini C. Recent advances in rabbit artificial insemination. 6th World Rabbit Congress, Toulouse, 1996; vol 2: 13-26.

7. Boiti C, Castellini C, Theau-Clément M, Besenfelder U, Liguori L, Renieri T and Pizzi F Guidelines for the handling of rabbit bucks and semen. World Rabbit Sci 2005; 13: 71-91.

8. Ola S., Oygbade MO. Buck effect on rabbit oestrous: vulva colour, vaginal lumen cells and ovarian follicle populations. World Rabbit Sc 2012; 20: 71-79.

9. Boussit D. Reproduction et insemination artificial en cuniculture. Association Française de Cuniculture, 1989, INRA, Lempdes, France, 234pp.

10. Martens L, Luzi F, Grilli G. Effects of PMSG induced oestrus on the performance of rabbit doe: a review. World Rabbit Sc 1995; 3(4): 191-199.

11. Boiti C, BesenfelderU, Brecchia G, Theau-Clément M, Zerani M. Reproductive physiopathology of doe. In: Recent Advances in Rabbit Science, 2006; Edited by L. Martens and P. Coudert, p3-20.
12. Klass P. Canine vaginal cytology during the estrous cycle. The Canadian Veterinary Journal 1985; 26(3): 101-104.
13. Tsiligianni T,Saratsi A, Besenfelder U, Anastasiadis A, Vainas E, Saratsis P, Brem G. The use of cytological examination of the vaginal smears (CEVS) in the selection of rabbits for superovulation. Theriogenology 2004; 61(6): 989- 995.
14. Theau-Clément M, Boiti C, Bonanno A, Eiben C, Martens L, Szendro Z. Alternative methods for the synchronisation of oestrous in lacting rabbit does. In: Recent Advances in Rabbit Science, 2006 ; Edited by L. Martens and P. Coudert, p21-38.

15. Dimitrova I, Angelov G,Teneva A, Uzev P. Artificial insemination of rabbit. Biotechnolgy in Animal Husbandry 2009; 25 (5-6): 1249-1253.

*Najjar A., *Ben Aicha E., *Ben Mrad M.

* National Institute of Agronomy of Tunisia

E-mail: amelnajarbenmatoug@yahoo.fr