EFFECT OF NURSING FREQUENCY ON RABBITS' PRODUCTIVE PERFORMANCE

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ABSTRACT

The objective of this experiment was to study the effect of nursing frequency on the performance of rabbits during both lactation and fattening periods. The trial was carried out at the Unidad de Investigación Aplicada en Producción Cunícola (UIAPC) from the Preparatoria Agrícola Departament, Universidad Autonóma Chapingo, Mexico, which is located at 19° 29´ N latitude, 98° 53´ W longitude, and 2250 meters altitude. The average monthly temperature is 15.2°C, the annual precipitation is 571.5 mm, and the rainy season takes during the summer. Intensive management was followed in which the pregnant does were housed in reproduction cages 4 days before the expected kindling. Each cage was provided with nest with a door allowed to have controlled access. In group nursed once the doors were opened at 7 a.m. for a period of 15 min while in the group nursed twice they were opened twice a day, at 7 a.m. and at 7 p.m. If a doe did not want to go into the nestbox for nursing she was enclosed in it. Animals were managed in 3 bands: red (R), green (G) and yellow (Y). All of the bands were managed in a 42-day reproduction rhythm in three batches. Both the litters and the does were moved to fattening cages on day 35 after kindling, but does returned to reproduction cages on day 40 for the next kindling. Data of 122 does and their litters (983 kits at birth), belonging to green and yellow bands were analysed from February to June 2003. Litter size and litter weight at birth, at 21d, at weaning, and at slaughter were recorded, then the average weight of rabbits was calculated. Mortality of each period was calculated. The following model was used to analyse the experimental data: $Y_{ij} = \mu + T_i + B_j + b(x_{ij} - z) + e_{ij}$; where Y_{ij} = independent variable , μ = population mean, T_i = effect of treatment (nursing), B_j = effect of band, x_j = individual litter size, z = population mean of liter size, b = the regression coefficient, e_j = error. Previously to the analysis arcsin transformation was applied to mortality, then general linear model of SAS (1990) was applied to all of the variables. The independent variables were: kits' weight at 21 d of age, weaning weight, slaughter weight, mortality from birth to 21d, from 21d to weaning, and from weaning to slaughter. Treatment has significant ($P<0.05$) effect on 21 d weight and weaning weight but it did not influence the slaughter weight and mortality. Rabbits from does nursing twice a day were heavier by 14 and 30 g at 21d and at weaning, respectively than rabbits from does nursing once a day.

Key words: Rabbit, nursing frequency, performance.

INTRODUCTION

In the current rabbit industrial management system does are allowed to nurse their litter only once a day for 5 to 10 minutes, then they are not permitted to go into the nestbox for a 24 h period. This management has been developed to reduce the mortality of kits during early lactation, however according to HOY *et al*. (2000) 30 to 50% of the does nurse their kits twice a day if they are allowed to nurse freely. The milk production is affected by the litter size and its persistency is known to be influenced by the time of the next mating; since earlier remating results earlier decreasing in the lactation curve (MCNITT *et al*., 2000).

SZENDRÖ *et al*. (2002) examined the effect of nursing the kits twice a day by 2 different does until day 35 postpartum. They found that kits nursed twice a day consumed 1.89 times more milk and the 21d body weight was 1.7 times higher than that of the control rabbits. It is well known that the growth of kits during the nursing period, especially during the first three weeks of their life, greatly affects their later performance.

Under commercial conditions, producers do not have 2 does for each litter, but some does nurse twice a day as SALCEDO-BACA *et al*. (2003a) observed it. They found that the increasing suckling frequency increase the daily milk production: 3232 and 4070 g per lactation of one or two nursing, respectively, while the peak of lactation was reached at days 17-18 and 19-20 in case of one or twice nursing, respectively (SALCEDO-BACA *et al*., 2003b). Authors showed the effect of nursing frequency on the weaning weight but not on the later performance of rabbits.

The objective of this study was to examine the effect of the nursing frequency on the performance of the rabbits during both nursing and fattening periods.

MATERIAL AND METHODS

Location and climate

The trial was carried out at the Unidad de Investigación Aplicada en Producción Cunícola from the Preparatoria Agrícola Departament (UIAPC), Universidad Autonóma Chapingo, Mexico, which is located at km 38.5 México-Texcoco Highwey, at 19° 29´ N latitude, 98° 53´ W longitude, and 2250 metres altitude. The average monthly temperature is 15.2°C, the annual precipitation is 571.5 mm, and the rainy season is in the summer (GARCIA, 1981).

Housing

The floor of the rabbit house was concrete, the roof consisted of zinc sheets with insulator in the internal side. Walls were made of bricks and concrete, the ventilation inlets were covered with mosquito net. Three levels of battery cages (980 x 320 x 380 mm) were used in the experiment. Half of the cages was used for reproduction (210 cages), while the another half for fattening (240 cages). Commercial pellet was fed *ad*

libitum from feeders. Cages had automatic watering system with nipple drinkers from which drinking water was available *ad lib*.

Animals management

Conventional management was followed in which the pregnant does were housed in reproduction cages 4 days before the expected kindling. Each cage was provided with nestbox with a door which allowed to have controlled access. In group nursed once the doors were opened at 7 a.m. for a period of 15 min while in the group nursed twice they were opened twice a day, at 7 a.m. and at 7 p.m. If a doe did not want to go into the nestbox for nursing she was enclosed in it (it occured only in the beginning of the experiment). Does were not allowed to nurse on day 10 and they were artificially inseminated on day 11 after kindling. Pregnancy diagnosis was performed on day 11 after mating with palpation through the abdominal wall. Animals were managed in 3 bands: red (R), green (G) and yellow (Y). All of the bands were managed in a 42-day reproduction rhythm in three batches. Both the litters and the does were moved to fattening cages on day 35 after kindling, but does returned to reproduction cages on day 40 for the next kindling. Cages were cleaned and disinfected before any movement of animals. After weaning rabbits received antibiotic (Oxitetracyclin or Neomycin in the water; 0.5 g/l) for a 10 d period as a prevention.

Records and statistical model

A total of 122 multiparous does with their litters were involved into this trial. Number of animals in age categories and treatments are shown in Table 1.

Table 1. Number of rabbits in age categories and treatments.

Animals		Nursed once	Nursed twice
Does		61	61
Rabbits at			
	birth	486	497
	21 d	460	462
	weaning	447	450
	slaughter	366	365

Data of rabbits belonging to green and yellow bands were taken from February to June 2003. Litter size and litter weight were recorded at birth, at 21 days of age, at weaning and at slaughter. The average weight of rabbits were calculated by dividing litter weight by litter size. Mortality (MOR) of each period was calculated and given in percentage.

The experimental data were analysed using the following model:

$Y_{ij} = \mu + T_i + B_j + b(x_j - z) + e_{ij}$

where

Y_{ij} = independent variable , μ = population mean, T_i = effect of treatment (nursing), B_j = effect of band, x_{ij} = individual litter size, z = population mean of liter size, b = the regression coefficient, e_{ij} = error.

Previously to the analysis arcsin transformation was applied to mortality, then general linear model of SAS (1990) was applied to all of the variables. The independent variables were kits' weight at 21 days of age (21dW), weaning weight (WW), slaughter weight (SW), and mortality from birth to 21d (MOR21), from 21d to weaning (MORw), and from weaning to slaughter (MORs). Litter size at birth (LSb), at 21d (LS21), and at weaning (LSw) were involved as covariates analysing the data of 21dW, WW, and SW respectively.

RESULTS AND DISCUSSION

Treatment had significant effect (P<0.05) on 21 d weight and weaning weight but it did not influence the slaughter weight and mortality of each period. Band had significant effect on weaning weight (P<0.01) and on the mortality between 21d and weaning (P<0.05) but the other variables were not influenced by that. Effect of litter size (used as covariate) was significant on 21dW, SW (P<0.05) and on MORw (P<0.01; Table 2.)

Table 2. Effects of the independent variables.

	21dW	WW	SW	MOR21	MORw	MORs
T	*	*	NS	NS	NS	NS
B	NS	**	NS	NS	*	NS
LSb	*			NS		
LS21		NS			**	
LSw			*			NS

21dW: kits' weight at 21 d of age; WW: weaning weight; SW: slaughter weight; MOR21: Mortality from birth to 21d; MORw: Mortality from 21d to weaning; MORs: Mortality from weaning to slaughter; LSb: litter size at birth; LS21: litter size at 21d; LSw: litter size at weaning; *: P<0.05; **: P<0.01; ***: P<0.001; NS: not significant

Least square means of weights, litter sizes and mortalities are shown in Table 3. At birth (in the beginning of the experiment) the average weight and litter size were similar. Rabbits from does nursing twice a day were heavier by 14 and 30 g at 21d and weaning, respectively than rabbits from does nursing once a day.

In our experiment the difference found in the weaning weight of rabbits nursed once or twice a day was about 30 g, while SALCEDO-BACA *et al*. (2003a) found higher difference in this trait (nursed once or twice: 511g and 657g, respectively). The difference in these results could be caused by the different litter size used, since in the experiment of SALCEDO-BACA *et al.* (2003a) the average litter size at weaning was 4.8 while in our experiment it was 7.4. It seems that twice a day nursing increase the milk production of does and the litter weight at weaning more in case of smaller litter size.

In our experiment the treatment had no effect on slaughter weight, while in the study of SZENDRÖ *et al*. (2002) the slaughter weight (at 10 weeks of age) of rabbits nursed twice a day was higher (2.88 vs. 2.49 kg in rabbits nursed twice or once a day, respectively). No significant differences were found in the mortality rates of each period between treatments. Mortality rate was higher during the fattening period (18%) than during the suckling period (13%). This could be associated with the fact that during the fattening period the green band was involved simultaneously into a study in which 2 commercial feed formulas and 2 prebiotics were fed tying to avoid the use of antibiotics in the prevention of diarrhea.

Since does nursing twice a day have higher nutritional demands, it can be considered that nursing twice a day could affect negatively the does' performance in the following kindlings by reducing their fertility or their body weight. However, SALCEDO-BACA *et al*. (2003a) did not found such effect. The performance of primiparous does could be different, since they are still growing and their nutritional requirements are higher.

Table 3. Effect of nursing frequency on weight of kits, litter size and mortality.

Variable		Nursed once mean±SE	Nursed twice mean±SE
Weight (g) at			
	birth	58±1.6	60±1.8
	21 d	281±3.8^{A}	294±4.3^{B}
	weaning	604±15^{A}	634±15^{B}
	slaughter	1966±25	2017±21
Litter size at			
	birth	7.96±0.12	8.14±0.09
	21 d	7.54±0.13	7.58±0.11
	weaning	7.33±0.15	7.38±0.14
	slaughter	6.00±0.21	5.98±0.20
Mortality (%)			
	from birth to 21 d	5±1	4±1
	from 21 to weaning	7±1	10±2
	from weaning to slaughter	18±2	18±2

Different marks in the rows denote significant difference between treatments (P>0.05).

CONCLUSIONS

Weight at 21 days of age and at weaning became significantly higher as a result of nursing twice a day, while the nursing frequency had no effect on the slaughter weight and on the mortality. Twice a day nursing for multiparous does can be recommended when labor cost is low. Research should be performed to study the performance of primiparous does.

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