INFLUENCE OF MALE ON REPRODUCTIVE PERFORMANCE OF ALGERIAN LOCAL POPULATION RABBIT

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ABSTRACT

The aim of this work was to study the influence of male on reproductive performance of Algerian local population rabbits. Over 1 or 2 years according to the farm, a total of 274 females and 75 males carried out 1734 mating in three farms in the Tizi-ouzou area (Algeria). Reproductive performances (mating acceptance rate, fertility rate, litter size and litter weight at birth and at weaning) were analyzed according to the male's age and average weight at mating time. Results showed that the buck's average weight had generally no significant effect on reproductive performance. Mating acceptance and fertility were affected by male's age at mating: younger ones whose age was less than 190 days provided the best results (acceptance rate = 85.3 %; fertility rate = 83.1 % *vs* 73.7% and 73.1% for males older than 330 days at mating). These observations, particularly the effect of male's age on mating results, suggest that the elimination of old males (older than one year) may improve the average production of a rabbitry. Nevertheless this conclusion must be confirmed with other rabbit populations and conditions.

Key words: Rabbit, Male, Reproduction, Age, weight.

INTRODUCTION

Male rabbits are the basis of reproductive success, given that farm profitability depends not only on the female's fertility but also upon the buck. Male fertility is also an interesting trait in rabbit breeding, because together with the doe it determines reproductive and productive success (Piles *et al.*, 2006). Moreover, due to the fertilizing capacity of semen, the male can influence not only fertility and conception but also the productivity of the does (Alvariño, 2000). Thus, the aim of this work was to study the influence of male on reproductive performance of Algerian local population rabbits.

MATERIALS AND METHODS

Rearing conditions

Our experiments were carried out at three breeding sites in the Tizi-ouzou area (Algeria): UMMTO site: experimental farm of University Mouloud Mammeri, ITMAS site (agricultural Institute of Boukhalfa) and the Djebla cooperative. Males and females were individually housed in wire cages arranged in flat-deck. Cages were provided with a feeder for feed and an automatic watering system. Lighting was natural. The rabbits were fed *ad libitum* with a commercial pelleted diet (maize 25 %, alfalfa 36 %, hard wheat bran 28%, soybean meal 10%, minerals and vitamins premix 1%). The diet contained 16 % crude protein and 10% crude fiber.

Animals and experimental design

A total of 75 bucks and 274 does of Algerian local rabbit populations were involved in the study i.e. 99 females and 22 males in UMMTO, 60 females and 22 males in ITMAS and 115 females and 31 males in Djebla. In UMMTO site, the rabbits so-called "local" are characterized by high variability in

their coat color (Zerrouki *et al.*, 2005). In ITMAS and Djebla sites, the rabbits were issued from commercial French hybrid rabbits imported in Algeria in 1985-1986, are called "white population" because of its albino phenotype (Zerrouki *et al*., 2007). The first mating was held at about 4 months of age for the does and 5 months for the bucks. The reproduction rhythm was semi intensive based on natural mating (kindling-mating theoretical interval of 10 to 12 days). The diagnosis of pregnancy was made by abdominal palpation 12 at 14 days after mating and non-pregnant does were immediately presented to a male for mating. Weaning took place 30 days after parturition. Parameters analyzed were the mating acceptance rate (percentage of females which accepted service), fertility rate (percentage of mated females giving birth), prolificacy (total born, born alive, number of weaned per litter), litter weight at birth and at weaning. Buck's weight was controlled at each mating.

Statistical analysis

All variables were submitted to analysis of variance using SAS software, taking into account the fixed effects of the age of the buck at mating time (5 levels: < 190 days, ≥190 and <260 days, ≥ 260 and < 330 days, ≥ 330 and < 400 days and ≥400 days. the average buck's weight at mating (3 levels: light, medium, heavy). The average weight of the males was very different according to the site, therefore the males have been classified intra-site: Medium = mean ± ½ standard deviation, light those that are smaller and heavy the largest. UMMTO: light <2862 g and heavy> 3192 g; ITMAS: light <3041 g and heavy> 3389 g; Djebla : light <3522 g and heavy> 3856 g. Season effect (3 levels) and breeding site effect (3 levels) were also included in the statistical model, but results are not presented in this short paper.

RESULTS AND DISCUSSION

Buck's Age effect

Mating acceptance was affected by male's age at mating: younger ones whose age was less than 190 days provided the best results (table1). But fertility and prolificacy did not vary significantly with male's age. However, in Egypt, Moussa-Balabel (2004) found a significant effect of male's age on conception rate of New Zealand strain rabbits. This author reported that the conception rate is higher among older males of 6 to 8 months (100%) compared to males aged 4 months (75%).

According to Alvariño (2000) and Castelleni (2008), males aged between 5 and 24 months are more fertile and produce larger litters at birth. In this study, the age of males ranged in this interval (6-14 months) which probably explain the lack of a significant effect of age on fertility and on prolificacy.

The buck's weight at mating varied significantly according to male's age (P <0.001). The youngest rabbits (<190 days) were lighter (3098 g) because they had not finished growing yet. Before the age of 400 days, males' weight increased steadily up to 3490 g to decrease significantly from 400 days. Chiericato *et al.* (1993) showed that males aged 85 days have a higher bodyweight than those aged 71 days (2680g *vs* 2221g) and higher food consumption. However, Luzi *et al.* (1996) recorded a decrease in the food consumption of males with age, between 21 weeks and 47 weeks which affected their weight gain.

Table 1: Reproductive performance according to male's age at mating

Male's age (days)	<190	≥190 and<260	≥260 and<330	≥330 and<400	≥400	P
Reproductive performance:						
Acceptance rate (%)	85.3±35[a]	81.9±38[ab]	79.3±40[abc]	73.2±44[c]	74.1±44[bc]	0.0029
Fertility rate (%)	83.1±37	80.0±39	81.1±39	71.0±45	75.2±43	0.096
Total born /litter	6.85±2.29	7.04±2.60	7.18±2.57	7.05±2.53	7.07±2.40	0.66
Born alive /litter	6.00±2.60	6.80±2.87	6.24±2.74	6.34±2.65	6.00±2.37	0.68
Weaned /litter	5.16±2.12	5.12±2.49	5.19±2.20	5.32±2.16	4.87±2.19	0.68
Litter weight at birth (g)	327±130	341±131	348±123	355±123	327±146	0.58
Mean kit's weight at birth (g)	55±18	58±18	58±29	57±13	55±13	0.76
Litter weight at weaning(g)	2426±823	2517±895	2493±850	2482±890	2466±837	0.50
Mean kit's weight at weaning g)	479±121	502±141	507±144	483±124	491±125	0.32
Buck's weight at mating (g)	3098±392[d]	3299±398[c]	3420±391[b]	3490±452[a]	3272±471[c]	< 0.0001

[a,b,c,d] Means with different letters at each trait are significantly different P<0.05.

Buck's Weight effect

The buck's average weight at mating had generally no significant effect on reproductive performance (Table 2). Furthermore Mefti-Korteby *et al.* (2010), on Algerian local population, recorded a very low positive correlation between reproductive performance and male's weight but Rodriguez-Lara *et al.* (2010) on artificial insemination reported that lighter males produced better semen, thus more fertile compared to heavier ones. In this study, the lack of male's effect could be related to natural mating practiced. Indeed Piles *et al.* (2006) reported a lower buck's effect of natural mating than in artificial insemination. Moreover Matheron and Rouvier (1978) and Blasco *et al.* (1993) reported that litter size at birth is related to ovulation rate, implantation rate and prenatal survival, not buck's weight.

Table 2: Reproductive performance according to male's weight at mating

Male's weight	**Light**	**Medium**	**Heavy**	***P***
Reproductive performance:				
Acceptance rate (%)	83.7±37	77.3±42	75.7±43	0.21
Fertility rate (%)	79.9±40	79.6±40	74.8±43	0.18
Total born /litter	7.09±2.54	7.03±2.51	7.07±2.52	0.97
Born alive /litter	6.24±2.72	6.11±2.72	6.15±2.68	0.96
Weaned / litter	5.26±2.34	5.11±2.21	5.14±2.29	0.84
Litter weight at birth (g)	332±126	352±128	337±132	0.71
Mean kit's weight at birth(g)	54±28	60±19	56±13	0.43
Litter weight at weaning(g)	2344±778	2498±904	2659±867	0.12
Mean kit's weight at weaning (g)	460±140	503±129	529±132	0.08
Buck's weight at mating (g)	**2992±322[c]**	**3429±378[b]**	**3596±377[a]**	< 0.0001

[a,b,c] Means with different letters are significantly different P<0.05.

CONCLUSIONS

These results, especially the effect of male's age on mating, suggest that the remove of old males (older than one year) may improve the average production of a rabbitry. Nevertheless this conclusion must be confirmed with other rabbit populations and conditions.

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