http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 9 (15): 2909-2911, 2006
ISSN 1028-8880

Genetic Parameter Estimates for Pre-Weaning Litter Traits in Rabbits

[1]M. Orunmuyi, [2]I.A. Adeyinka, [1]O.A. Ojo and [1]F.D. Adeyinka
[1]Department of Animal Science, Ahmadu Bello University Zaria,
[2]National Animal Production Research Institute (NAPRI),
Ahmadu Bello University Shika, Zaria

Abstract: One hundred and eleven litter records obtained from the mating of 8 bucks to 22 does of a non-descript population were used to provide estimates of heritability and genetic correlations for pre-weaning litter traits. Least square means and standard errors for fur score, litter size at birth, litter size at weaning and weaning weight were: 30.3±0.17, 3.72±0.12, 4.8±0.12, 3.6±0.14 and 480.70±22.43 g, respectively. The least square analysis of variance revealed that most of the productive traits studied exerted significant effect on weaning weight with the exception of litter size at birth and gestation length. Heritability estimates obtained for gestation length, fur score, litter size at birth, litter size at weaning and weaning weight were 0.60±0.39, 1.46±0.56, 1.09±0.51, 1.49±0.59 and 1.07±0.51, respectively. Genetic correlations were high and positive in most cases with the exception of correlations between gestation length and weaning weight and litter size at weaning and weaning weight which were negative. Phenotypic correlations were also high and positive in most cases except for gestation length and fur score and gestation length and weaning weight which were negative.

Key words: Rabbits, genetic parameters, heritability, litters

INTRODUCTION

Prolificacy in rabbits is determined by the number of kittens born alive at kindling and birth to weaning viability. The larger the number surviving to weaning, the better the production efficiency of the rabbit enterprise.

The two main tools for genetic improvement especially in the developing countries where production of rabbit is finding increasing importance as a protein source are selection and mating system (Khalil *et al*., 1986). To employ these tools, certain genetic parameters such as heritability and genetic correlations must be determined. The knowledge of the genetic parameters enables the breeder to decide on the best method of selection to achieve rapid genetic progress. The genetic parameter estimates for litter traits in different breeds of rabbits have been reported by Rathor *et al*. (2000), Reddy *et al*. (2000) and Borthakur *et al*. (2002).

Much genetic research have been carried out on exotic breeds of rabbits and their crosses but information on local (non-descript) breeds are scanty, hence the objectives of this study are to determine the factors affecting weaning weight of kit in a non-descript population of rabbits, to determine the heritability estimates of pre-weaning litter traits and to estimate the genetic and phenotypic correlations among pre-weaning litter traits.

MATERIALS AND METHODS

The study was carried out at the Rabbitary Unit of Animal Science Department, Ahmadu Bello University Zaria.

Data was obtained by mating 22 does to 8 bucks, producing 111 kittens in two matings. All the rabbits were housed in individual cages. Matured does were flushed with a diet of 20% crude protein. Water was provided *ad libitum*, while forages were supplied as supplements. The mating procedure involved taking the does to the bucks to be mated, the does mating date was recorded. Pregnancy determination (by abdominal palpation) was done at 14 days after coitus, and non pregnant does were returned to the bucks' cage for service.

Kindling pots were placed in the cage with some litter material to assist in providing some warmth for the expected kittens. Kindling dates were recorded and the amount of fur pulled by the does was scored according to Zsoh and Kustos (1988).

- When there was no fur in the nest pot.
- When there was hardly any fur in the nest pot.
- There was enough fur between the shavings, but the kittens were not covered up at all.
- The suckling rabbits were slightly covered up.

Corresponding Author: Dr. I.A. Adeyinka, National Animal Production Research Institute (NAPRI),
Ahmadu Bello University Shika, Zaria Tel: +234 806 816 3290

- The nest was covered up with fur but some kittens were still visible.
- The nest was covered up thickly with fur.

The number of times the doe kindled was recorded (parity of doe). Kittens were weighed weekly until the time of weaning (4-6 weeks) and the weaning weight was taken as well as the weaning age.

RESULTS AND DISCUSSION

Table 1 shows the least square means and standard errors for gestation length, fur score, litter size at birth, letter size at weaning and weaning weight. The values obtained were 30.3±0.17, 3.72±0.12, 4.8±0.12, 3.60±0.14 and 480.70±22.43 for the above mentioned parameters, respectively. The value obtained for gestation length was in close agreement with Khalil and Soliman (1988) and Das *et al.* (1997) while the value for fur score is lower than what was obtained by Zsoh and Kustos *et al.* (1988) for New Zealand white and Californian does. This may be due to differences in breed and environment. However, values obtained for litter size at birth was in close agreement with Odubote and Somade (1992), for pure bred Californian does while that of litter size at weaning was low compared to earlier reports by Borthakur *et al.* (2002). This may also be due to differences in breed and environment.

Effect of Sire, Dam, Parity of doe, litter size at weaning and weaning age were observed to be highly significant while gestation length and litter size at weaning were observed to have a non-significant effect on weaning weight (Table 2).

The highly significant effect of Sire on weaning indicates the variability of the Sires on the higher weaning weight, Odubote and Somade (1992), had reported significant effect or Sire on weaning weight. The highly significant effect of doe on the weaning weights agrees with what was obtained by Odubote and Somade (1992). This proves the maternal effect and or milk production of the does on the weaning weight of the kittens. Also, the highly significant effect of parity on weaning weight implies that the higher the parity, the heavier the weaning weight. This agrees with earlier reports by Prayaga and Easdyu (2002). Significant effect of litter size at weaning, on weaning weight means that the higher the litter size at weaning the smaller the weaning weights. However, litter size at birth and gestation length had a non-significant effect on weaning weight, though this contradicts earlier reports by Reddy *et al.* (2000). The implication of the non-significant effect of litter size at birth on weaning weight means that irrespective of the litter size at birth, kittens would grow and attain high weaning weight.

Table 1: Least square means and standard errors for productive traits of rabbits

Traits	No. of observation	Lest square means	Standarderror
Gestation length	111	30.30	0.17
Furscore	111	3.72	0.12
Littersize at birth	111	4.81	0.12
Littersize at weaning	111	3.60	0.14
Weaning weight	111	480.70	22.43

Table 2: Summary of analysis of variance for weaning weight

Source	df	MS	EMS	F-value
Sire	7	146726.4500	25471.2580	5.76***
Dam	29	98347.0490	9858.7700	9.98***
Littersize at birth	4	18673.1750	33735.2080	0.55NS
Parity of doe	5	216709.3500	2448.3620	8.86***
Gestation length	4	1864.5211	9934.7922	1.88NS
Littersize at weaning	5	89582.1720	30502.0370	2.94***
Weaning age	10	284391.2400	8067.1240	35.25***

*** $p<0.001$, df = degree of freedom, MS = mean sum of square, EMS = error mean sum of square, NS = Not Significant ($p>0.05$)

Table 3 shows the heritability, genetic and phenotypic correlations among the productive traits in the rabbits namely: gestation length, fur score, litter size at birth, litter size at weaning and weaning weight.

Heritability estimates was high for gestation length, but the estimate were higher for all other traits (Table 3) Ndjon and Nwakalor (1998) had reported similar high heritability estimates for pre-weaning litter traits in local and crossbred rabbits. This however contradicts reports of Odubote and Somade (1992) who obtained low heritabilities for Chinchilla, California, New Zealand white and their crosses. The high heritability estimates obtained for gestation length indicates high genetic influence, hence selection for this trait would result in genetic improvements. The high heritability values (>1.00) obtained for fur score, litter size at birth, litter size at weaning and weaning weight could be due to small data size.

The genetic correlations between the traits studied were positive except for the estimates between gestation length and weaning weight. The positive correlation indicates that improvement in any one trait will lead to improvement in the other. Phenotypic correlation for the traits studied ranged from -0.22 to 0.523. The high correlation obtained between litter size at birth and litter size at weaning (0.523) arose because a litter with a large size of live kittens at birth may likely have a corresponding large litter size at weaning. The high phenotypic correlation obtained in the study agrees with the report of Odubote and Somade (1992). In conclusion, the significant effect of Sire, Dam, Parity of doe, litter size at weaning and weaning age on weaning weight, suggests that selection can result in increased weaning weight. The heritability estimates in this study warrants further studies. Positive genetic correlations observed between gestation length and litter size at weaning, fur score and

Table 3: Heritability, genetic and phenotype correlations of some reproductive traits in rabbits

Traits	Gestation length	Furscore at birth	Littersize at weaning	Littersize weight	Weaning
Gestation length	0.601	0.050	0.103	0.897	0.532
Furscore	-0.118	1.462	0.568	0.23	0.708
Littersize at birth	0.297	0.148	1.088	0.833	0.245
Littersize at weaning	0.278	0.368	0.523	1.488	0.260
Weaning weight	-0.222	0.251	0.147	0.104	0.071

Above diagonal = Genetic correlation, Below diagonal = Phenotypic correlation, On the diagonal = Heritability

litter size at birth, fur score and weaning weight and litter size at birth and litter size at weaning suggests that improvement in one trait leads to improvement in the other traits.

REFERENCES

Borthakur, B., D. Das, G.C. Das, R.N. Goswami and K.M. Buzarbarua 2002. Studies on litter traits of New Zealand white rabbit. Ind. Vet. J., 79: 80-82.

Das, S., S.K. Ray, A.K. Pyne and R. Gupta, 1997. Datta Influence of genetic group and season of conception on some reproductive and productive traits of rabbits in West Bengal. Ind. Vet. J., 74: 226-229.

Khalil, M.H., E.A. Afifi and M.E. Emara, 1986. Doe litter performance at weaning for two breeds of rabbits with special emphasis on sire and doe effects. Animal Production Research Institute, Ministry of Agriculture, Cairo, Egypt, pp: 12-18.

Khalil, M.H. and A.M. Soliman, 1988. Genetic analysis for some reproductive traits in female rabbits. J. Applied Rabbit Res., 12: 205-208.

Ndjon, M.N. and N. Nwakalor, 1998. Estimates of genetic parameters in a mixed population of purebred and crossbred rabbits II. Proceedings of the Silver Anniversary Conference of the Nigerian Society for Animal Productions and the Inaugural Conference of the West African Society for Animal Production, March 21-26, Abeokuta, Nigeria, pp: 500-501.

Odubote, J.K. and B. Somade, 1992. Genetic analysis of rabbit litter traits at birth and weaning. Nig. J. Anim. Prod., pp: 64-68.

Prayaga, K.C. and S.J. Eady, 2002. Performance of purebred and crossbred rabbits in Australia; Doe reproductive and pre-weaning litter traits. Aust. J. Agric. Resour., pp: 993-1001.

Rathor Y.S., Y.P. Thakur, N.K. Manuja, S. Katock and K. Gupta, 2000. Performance of different meat rabbit breeds for litter traits. Ind. Vet. J., 77: 592-594.

Reddy, S.S., E.C. Gupta, B. Ramesh and A. Satyanarayana, 2000. Effects of in-breeding on pre-weaning litter weights on broiler rabbits. Ind. Vet. J., pp: 77597-599.

Zsoh, S. and K. Kustos, 1988. The relationship between nest making behaviour of the rabbit doe and litter performance. Research Center for Animal Production and Nutrition, Godollo, Hungary, 1: 247-248.