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# REPRODUCTIVE ABILITY OF RABBIT DAUGHTERS IN RELATION TO THE SIZE OF THEIR MOTHER LITTER

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## Introduction

Falconer (1955, 1960) observed in mice that the females from large litters produced litter sizes under the average one. In the last years, numerous investigations were carried out in the field of the pig breeding too. Van der Steen (1985) estimated a difference of 0.48 between the litter sizes of sows from litters with 12 and 6 piglets in favour of the later ones. Horn, P. et al., (1987) revealed significant differences comparing the reproduction performance of the daughters from sows with the highest and the lowes fertility. The litter size of blue fox daugter originating from litters of ≤4, 5-9 and ≥10 averaged 9.42, 9.55 and 9.91, resp. (Stolc and Louda, 1982). The first pieces of information about the rabbits were given by research workers from France. Babile and Matheron (1980) found a difference of 1.07 and 0.73 for the total and live born rabbits between the maternal groups from litters of 5 and 11 animals, resp. Carrying out investigations on greater populations (Babile ét al., 1984), a difference of 1.03, 1.01 and 1.55 was found between the groups for the total number, number of live born animals and for the weaned off animals resp.

With respect to selection these results are mediating. If the does originating from greater litters have poor fertility, the selection for increased litter size, depending on the measure of prenatal maternal effects, could be innefective. Therefore, the herdbook data of our population were evaluated and ivestigated the effect of the litter size where the doe was born and reared on the reproductive performance for various genotypes which were kept under identic feeding and management conditions.

## Material and methods

The investigations were carried out on 2 New Zealand White (line 1 and 2) and 1 Californian (line 3) population. The does were housed in flat-deck wirenet cages. The females were mated first at the age of 5 - 6 months and fed with pelet (crude protein 16 energy 11.5 , crude fiber 12.5 )ad libitum. Water supply was carried out by nipple drinkers with weighted valve.

Only those females were evaluated where the litter size at birht and the age of 21 days were equal or only 1 suckling rabbit died and the does had at least 3 - 4 litters.

This schedule was completed in the lines 1, 2 and 3 by 284, 266 and 243 does, resp. After 3 - 4 kinglings the total number of litters amounted to 1060, 985 and 894, resp.

The investigated production traits were as follows:
- litter size at birth
- ratio of the total litter losses
- ratio of rabbits reared up to the age of 21 days
- litter size at the age of 21 days.

The does were grouped according to litter size they were born:
A = females born and reared up in litters with 2 - 5 animals
B = females born and reared up in litters with 6 - 7 animals
C = females born and reared up in litters with 8 - 9 animals
D = females born and reared up in litters with 10 - 11 animals.

## Results

The performance data of the does from the three lines may be seen from the Table 1. The data of the Table are plotted also diagrammatically.

The litter size at birth in the line 1 - except the group D - shows a declining tendency. Between the groups A and C, the litter size decreased from 8.72 to 7.95 ($P<0.01$) while a high value could be stated for the group D (8.79; $P<0.01$).

An contrasted trend could be detected for the line 2 (except the group D) and for the line 3 (except the group A) but the differences were not significant.

The ratio of the total litter losses in the line 1 has increased parallel with the original litter size, but not significantly. In the lines 2 and 3 a decrease was stated. Significant differences could be detected in the line 2 between the groups A and B, and A and C ($P< 0,05$) and in the line 3 between the groups A and C or B and C ($P< 0,001$ and $P< 0.05$ resp.). The percentage of the reared animals in line 1 decreased as the original litter size has increased. Significant differences were found between groups A and B or A and D ($P<0,05$). Reserved relations appeared in lines 2 and 3. Significant differences could be detected in line 2 between groups A and B or A and C or A and D or B and D or C and D ($P<0,01$) and in line 3 between the groups A and B or B and D ($P<0,05$) and between groups A and C or A and D ($P<0,001$).

The tendencies in the litter sizes at birht were poor but because of the differences in the mortality, at the age of 21 days these relationships were significant. For instance, in the line 1 the litter size at the age of 21 days in the groups A significantly higher was compared to the other groups ($P<0,05$ and $P<0,01$, resp.). In the line 2, the litter size of the group A was lower compared to the other groups ($P<0,05$ and $P<0,01$, resp.). In the line 3 the performance of the group A was significant lower compared to the groups C and D ($P<0,01$) and the group D was greater compared to the groups A and B ($P<0,01$).

## Discussion

From the results provable with data follows that the size of the litter in which the doe was born and reared up, has not the same effect in all populations on the later production of the females. The performances of line 1 agree well with the results of Falconer (1955, 1960) on mices, of P. Horn et al., (1987) on pigs, of Babile and Matheron (1980), of Babile et al., (1984) on rabbits, i.e. the reproductive performance of does originating from great litters is lower than that of the females from small litters. These relationships are only valid for the litters with 2-9 animals because the does originating from litters with 10 - 11 animals performed above the average in some traits.

The results of lines 2 and 3 were in contradiction with the cited literary data Stolc and Louda (1982) excepted, i.e. the does originating from great litters performed also later well. As the investigations with the populations were carried out in the same year, in the same stall with the same feeding regime and management system, it could be suggested that the prenatal maternal effect is not the same in the various genotypes.

However, the earlier statement could *not* be generalized that the birht in great litters has a disadvantageous effect on the reproductive performance. Therefore, the influence of the litter size in which the does were born must be investigated before the selection decisions. In the populations without such kind of maternal effects greater genetic progress could be achieved. In our investigations, the selection for this trait could be a reasonable purpose in the line 2 and 3. It must be noted that considerable improvement could be expected for not litter size at birht but for mortality and losses (total litter loss, suckling mortality, etc.) and for the number of the reared progenies in these populations. Whereas, the selection of the line 1 for increased litter size could not be effective.

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Table 1

Development of the production of does depending on the litter size they were born

| Traits | Population | Originating from litter size | | | |
|---|---|---|---|---|---|
| | | 2 - 5 | 6 - 7 | 8 - 9 | 10 - 11 |
| | | A | B | C | D |
| Litter size at birth | 1 | $8.72^{b,c}$ | $8.25^{a,b}$ | $7.95^{a}$ | $8.79^{c}$ |
| | 2 | 7.85 | 8.04 | 8.26 | 8.18 |
| | 3 | 8.47 | 8.23 | 8.33 | 8.43 |
| Total litter losses, % | 1 | 10.7 | 13.3 | 15.3 | 12.1 |
| | 2 | $19.4^{a}$ | $11.2^{b}$ | $12.2^{a,b}$ | $8.9^{b}$ |
| | 3 | $25.2^{b}$ | $22.2^{b}$ | $14.2^{a}$ | $18.1^{a,b}$ |
| Ratio of reared animals, % | 1 | $71.5^{a}$ | $66.8^{b}$ | $68.4^{a,b}$ | $75.7^{b}$ |
| | 2 | $62.2^{a}$ | $72.6^{b}$ | $71.5^{b}$ | $76.9^{c}$ |
| | 3 | $59.6^{a}$ | $64.6^{b}$ | $67.5^{b,c}$ | $68.7^{c}$ |
| Litter size at the age of 21 days | 1 | $6.24^{a}$ | $5.51^{b}$ | $5.44^{b}$ | $5.78^{b}$ |
| | 2 | $5.88^{a}$ | $5.84^{b}$ | $5.91^{b}$ | $6.29^{b}$ |
| | 3 | $5.05^{a}$ | $5.32^{a,b}$ | $6.62^{b,c}$ | $5.79^{c}$ |

There were no significant differences between the groups with the same subscripts, but significant differences were found between the groups with different subscripts at the level $P<0.05$ at least.

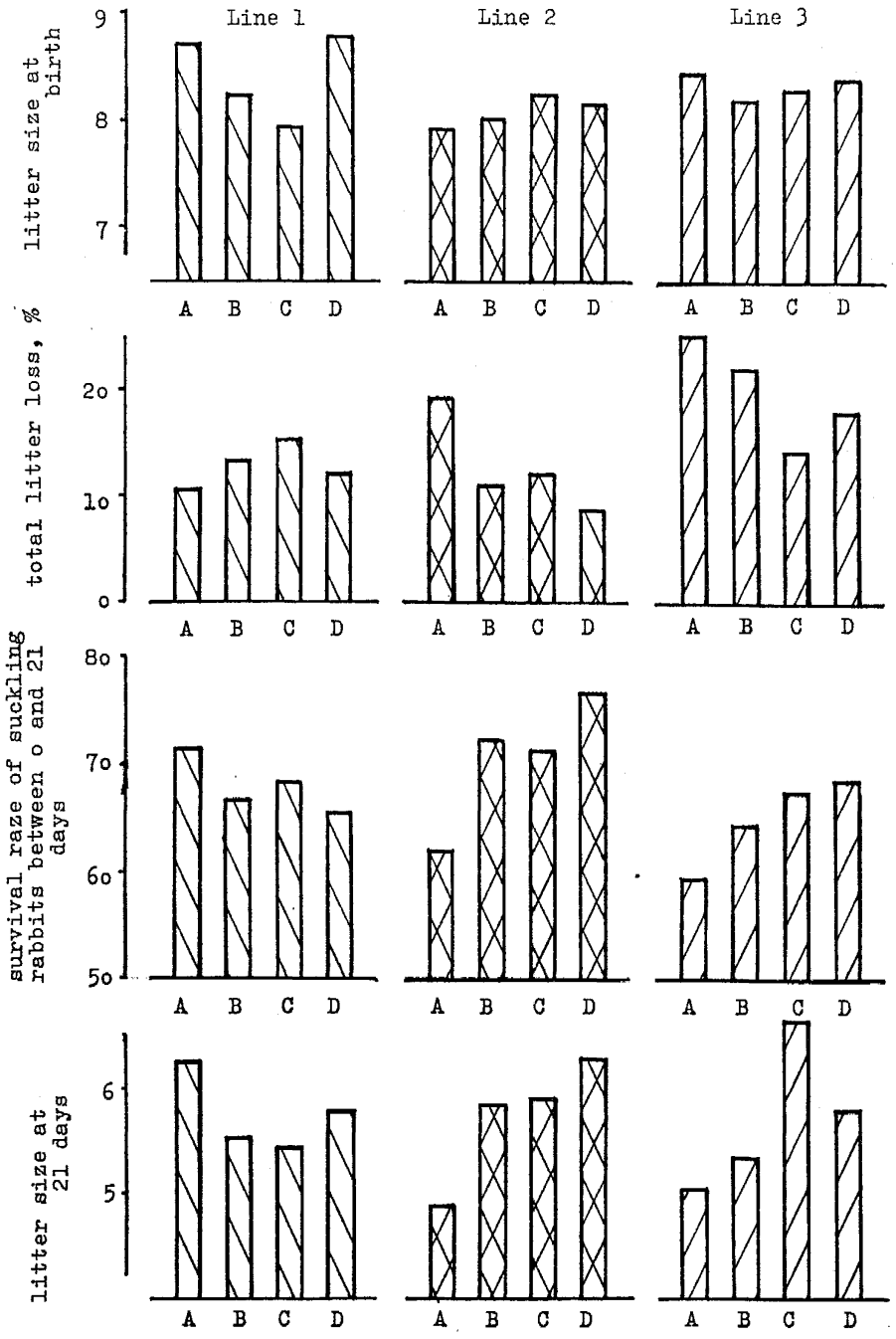


Fig. 1 Reproductive ability of rabbit daughters in relation to the size of their mother litter /A = 2-5, B = 6-7, C = 8-9, D = 1o-11/

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# THE EFFECTS OF LITTER SIZE ON THE REPRODUCTIVE PERFORMANCE OF THE PROGENIES

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The effect of originating litter size /maternal effect/ on the production of the female rabbits was investigated on 2 New Zealand White /G, H/ and 1 Californian /K/ populations. Based on the litter size at birth and the litter size at the age of 21 days, the total litter loss, the body weight gain of the litter, it could be stated that in the G line - except the females with litters of 10-11 animals - the production traits were generally decreased. In the H and K populations a reverse tendency appeared, i.e. the females from the greater litters had higher productions. Based on these findings it was stated by the authors that the earlier observation /that the females from greater litters have lower production/ could not be generalized.

# EINFLUSS DER WURFGRÖSSE AUF DIE REPRODUKTIONSLEISTUNG DER NACHKOMMEN

In 2 Kaninchenbeständen/Weisse Neuseeländer/ und einem Bestand /Kalifornier/ wurde untersucht, welchen Einfluss die eigene Abstammung bezüglich der Wurfgrösse auf die Reproduktionsleistung der Muttertiere hat. Aufgrund der Wurfzahl bei Geburt und im Alter von 21 Tagen, dem totalen Wurfausfall, der Mortalität während der Säugezeit, sowie der Lebendmassenzunahme des Wurfes wurde nachgewiesen dass die Produktionseigenschaften - mit der Ausnahme der Muttertiere von grossen Würfen /10 - 11 Jungtiere/ in der Linie G - sich im allgemeinen verschlechtern. Umgekehrte Tendenzen konnten in den anderen Beständen /H und K/, wo die Mütter aus grösseren Würfen höhere Leistungen erbrachten, beobachtet werden.
Verfasser stellten fest, dass die früheren Beobachtungen, wonach die Kaninchenmütter aus grösseren Würfen niedrigere Reproduktionsleistungen aufweisen im allgemeinen nicht gültig sind.