

CONNECTION BETWEEN REPRODUCTIVE PERFORMANCE AND PRODUCTIVE LIFETIME OF RABBIT DOES

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Abstract - 197 Pannon White does were divided into groups based on the total number of litters they had had (A = 1-3, B = 4-6, C = 7-9, D = over 9) and the length of time spent in production (below 0.5, 0.5-1, 1-1.5, 1.5-2 and over 2 years). It was established that the does performing over average at young age remained productive for a longer time. The authors are of the opinion that performance at young age gives indications of the animal's constitution. The constitutionally better and healthier does usually have a longer productive lifetime.

INTRODUCTION

From the economic point of view, does with a long productive life and high-level production would be desirable. Although there are rather few publications on this subject, it has been observed that does with higher production levels remain productive for a longer time. RINALDO and BOLET (1988) compared the production of does that had been selected for litter size for 7 generations with the production of control does. They established that the does producing larger litters on average of the first 3 kindlings remained productive for a longer time (589 days) as compared to the less productive and control does (487 and 499 days, respectively). By examining 4 lines, TORRES *et al.* (1986 and 1987) established that the does belonging to lines selected for litter size lived longer than those selected for weight gain.

The objective of our project was to examine and compare the production of does of different productive lifetimes in order to prove or disprove the statements outlined above.

MATERIAL AND METHODS

The investigation was carried out using Pannon White rabbits between 1988 and 1991. The does selected for the evaluations were all included in the herd book, had at least one littering and completed their productive life by the end of the experimental period, i.e. they died or they were culled.

The does were housed in closed buildings with windows and artificial lighting. These were heated in winter (15-16°C). The flat-deck cages were made of wire net. The does were bred first at the age of 5-6 months. They were rebred on the 23rd-25th day after delivery. They were fed a commercial diet *ad libitum* (crude protein: 17.1 %, crude fibre 13.2 %), and water was available continuously, from self-drinkers.

Based on their productive lifetime the does were sorted into 4 groups as follows:

- Group A: does with 1-3 litters;
- Group B: does with 4-6 litters;
- Group C: does with 7-9 litters;
- Group D: does with more than 9 litters.

In addition to the first littering result, the does' performance was also analysed for the same lifetime period (i.e. for litters 1-3, 4-6 and 7-9) in each group. The performance during the first six months was also evaluated as a function of the total productive lifetime of the does (i.e. below 0.5 year, 0.5-1, 1-1.5, 1.5-2 and over 2 years).

Data were statistically analysed using one-way analysis of variance and chi-square test by Stagraphics ver. 5.0.

RESULTS AND DISCUSSION

Table 1 contains the results of the experimental groups (A, B, C and D) for the first littering. The does who remained in production for the longest time had their first delivery earlier (188 days), required the fewest inseminations (1.2) to become pregnant, produced one of the largest litters (8.45), and nursed favourably large litters until the 21st day (7.65) and until weaning (7.00). No total litter loss was observed in this group, and the mortality rate of the suckling rabbits remained below 10 %. 21-day litter weight was also the largest (2341 g). Although the differences were significant in only a few cases, the does of Group B proved inferior to the others in the majority of the cases.

Table 1 : Relationship between performance at first delivery and productive lifetime

Parameters	Lifetime (based on number of litters)							
	A		B		C		D	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Number of does	109		42		26		20	
Body weight of does at delivery, kg	3.96	0.34	3.98	0.47	3.90	0.30	3.93	0.30
Age of does at first delivery, days	194	42	201	40	206	38	188	30
Number of inseminations for first delivery	1.27	0.54	1.31	0.64	1.35	0.69	1.20	0.52
Litter size at birth	8.11 ^{ab}	2.44	7.33 ^a	2.52	8.54 ^b	2.10	8.45 ^{ab}	1.85
Litter size at 21 days of age	7.01	2.12	6.93	2.16	7.48	2.16	7.65	1.73
Litter size at weaning	6.51	2.15	6.43	2.07	7.04	2.05	7.00	1.78
Total litter loss, %	0.9	-	2.4	-	3.8	-	0.0	-
Suckling mortality (between 0-3 weeks), %	11.3	-	6.7	-	14.0	-	9.7	-
Litter weight at birth, g	470	125	433	149	485	103	447	87
Litter weight at 21 days of age, g	2096 ^{ab}	560	2024 ^a	558	2288 ^{ab}	628	2341 ^b	411

Observation: Means with different letters are significantly different ($P < 0.05$)

A = does with 1-3 litters; B = does with 4-6 litters; C = does with 7-9 litters; D = does with 9< litters.

A similar tendency takes shape when comparing the performances for the first 3 deliveries (Table 2). In the traits examined (i.e. number of inseminations for one delivery, interval between two kindlings, litter size at birth, 21 days of age and weaning, total litter loss and suckling mortality, litter weight at birth and 21 days of age) Groups A and B proved to be inferior, while Groups C and D were superior to the others in most cases. Regarding litter size the difference between Groups B and C was significant ($P < 0.01$ and 0.05). In later periods of life (i.e. litters 4-6 and 7-9) the differences actually disappeared, the only exception being that Group D did extremely well concerning the number of days required for one delivery. (The small S.D. - value found in Group D was also conspicuous.).

By grouping the does based on their productive lifetime (i.e. below 0.5 year, 0.5-1, 1-1.5, 1.5-2 and over 2 years), the relationship with the does' performance during the first six months proved more unambiguous than in the previously described evaluations (Table 3). Looking at litter size (total, at 21 days of age and at weaning), suckling mortality and the number of litters during the first six months, the superiority of the does remaining productive for more than 2 years is even more clearly outlined. During the later period of life the order of the groups also changed here.

Our findings are in accordance with the observations reported by TORRES *et al.* (1986 and 1987) and RINALDO and BOLET (1988). Drawing the conclusion that productive lifetime has any direct effect on the performance at young age would however be incorrect. The point in this issue is most likely that the young does who are healthy and of good constitution are able to perform over the average, and of course, it is these individuals who also remain in production for a longer time.

A similar observation was also made in other experiments. Those does who became post-partum pregnant 3 or 4 times showed above-average raising of their progeny. Also, the 21-day litter size, 21-day litter weight and the 21-day individual body weight of the progeny were all better than in the case of the does bred according to the same pattern but who delivered at longer intervals (SZENDRÔ, 1989). The does who were inseminated artificially during the nursing period and became pregnant produced larger litters than those who became pregnant only for the second service (after weaning; SZENDRÔ *et al.*, 1992). The does born and reared in

larger litters showed above-average performance even in the case that the flock in question could be characterised by certain litter size and by the tendency that production became reduced parallel with an increase in the litter size in which the does were born (SZENDRÓ *et al.*, 1989). Total litter loss was less frequent in the case of the does producing large litters than in the case of below-average litter size (SZENDRÓ and BARNA, 1984).

Table 2 : Relationship between performance and productive lifetime

Lifetime (groups)	Number of litters											
	1-3			4-6			7-9			above 9		
	n	Means	SD	n	Means	SD	n	Means	SD	n	Means	SD
<i>Number of inseminations for one delivery</i>												
A	109	1.38	0.50	-	-	-	-	-	-	-	-	-
B	42	1.39	0.42	-	1.44 ^{ab}	0.52	-	-	-	-	-	-
C	26	1.35	0.27	-	1.44 ^a	0.44	-	1.57	0.59	-	-	-
D	20	1.22	0.25	-	1.12 ^b	0.20	-	1.20	0.33	-	1.63	0.64
P<		NS			0.01			NS				
<i>Littering interval (days)</i>												
A	68	78	25	-	-	-	-	-	-	-	-	-
B	42	74	25	21	71	25	-	-	-	-	-	-
C	26	78	17	26	70	19	18	78	16	-	-	-
D	20	67	18	20	77	23	20	70	15	15	74	27
P<		NS			NS			NS				
<i>Litter size at birth</i>												
A	207	8.00 ^{ab}	2.69	-	-	-	-	-	-	-	-	-
B	126	7.64 ^a	2.63	69	7.88	3.07	-	-	-	-	-	-
C	78	8.64 ^b	2.36	78	8.15	3.08	51	7.39	3.22	-	-	-
D	60	8.48 ^{ab}	2.23	60	8.07	2.96	60	7.25	3.06	60	7.25	2.96
P<		0.02			NS			NS				
<i>Litter size at 21 days of age</i>												
A	196	7.04 ^{ab}	2.34	-	-	-	-	-	-	-	-	-
B	123	6.97 ^a	2.25	66	7.24	2.62	-	-	-	-	-	-
C	76	7.68 ^b	2.34	76	6.88	2.59	50	6.38	2.62	-	-	-
D	60	7.50 ^{ab}	1.74	60	7.07	2.49	60	6.13	2.63	60	6.30	2.45
P<		0.01			NS			NS				
<i>Litter size at weaning</i>												
A	196	6.52 ^{ab}	2.29	-	-	-	-	-	-	-	-	-
B	122	6.52 ^a	2.09	64	6.64	2.41	-	-	-	-	-	-
C	73	7.23 ^b	2.15	76	6.88	2.59	50	5.88	2.09	-	-	-
D	60	7.00 ^{ab}	1.92	60	6.69	2.34	60	5.77	2.49	63	5.89	2.42
P<		0.05			NS			NS				
<i>Total litter loss, %</i>												
A	207	5.3	-	-	-	-	-	-	-	-	-	-
B	126	2.4	-	69	4.4	-	-	-	-	-	-	-
C	78	2.6	-	78	2.6	-	51	2.0	-	-	-	-
D	60	0.0	-	60	3.3	-	60	0.0	-	60	0.0	-
P<		NS			NS			NS				
<i>Suckling mortality (between 0-21 days), %</i>												
A	196	10.6	-	-	-	-	-	-	-	-	-	-
B	123	8.4	-	66	8.7	-	-	-	-	-	-	-
C	76	11.9	-	76	13.3	-	50	11.5	-	-	-	-
D	60	10.1	-	60	10.1	-	60	12.2	-	60	11.2	-
P<		NS			NS			NS				
<i>Litter weight at birth, g</i>												
A	207	477 ^{ab}	139	-	-	-	-	-	-	-	-	-
B	126	456 ^a	138	69	474	167	-	-	-	-	-	-
C	78	511 ^b	132	78	495	164	51	439	173	-	-	-
D	60	489 ^{ab}	118	60	490	147	60	455	160	60	445	166
P<		0.01			NS			NS				
<i>Litter weight at 21 days of age, g</i>												
A	196	2115	610	-	-	-	-	-	-	-	-	-
B	123	2150	634	66	2223	693	-	-	-	-	-	-
C	76	2299	610	76	2182	757	50	2120	651	-	-	-
D	60	2312	470	60	2223	654	60	1964	672	63	2112	608
P<		NS			NS			NS				

Means with different letters are significantly different. Group A, B, C and D see Table 1

Table 3 : Comparison of the production of does remaining productive for different periods (does' performance during the first six months)

Productive traits	Time spend in production, years									
	below 0.5		0.5-1		1-1.5		1.5-2		over 2	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Number of kindlings	128		137		86		63		48	
Litter size										
at birth	7.84 ^a	2.38	7.95 ^a	2.43	8.05 ^{ab}	2.27	8.70 ^{bc}	2.13	9.02 ^c	2.03
at 21 days of age	6.40 ^a	2.13	6.86 ^{ab}	2.13	7.00 ^{bc}	2.08	7.49 ^{cd}	1.98	7.96 ^d	1.83
at weaning	5.88 ^a	2.11	6.44 ^b	2.09	6.38 ^b	2.01	6.79 ^b	1.92	7.56 ^c	1.81
Suckling mortality, % (total litter loss included)	17.7 ^a		13.7 ^b		12.5 ^b		13.9 ^{ab}		11.7 ^b	
Number of litters for the first six months	1.69		2.68		2.86		2.74		2.82	

^{abcd} Values with different superscripts within the same row differ by P<0.05.

To summarise, our experimental results confirm that does performing above average for the first 3 deliveries or during the first six months spent in production are constitutionally superior and, therefore, they remain productive for a longer time.

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Zusammenhang zwischen reproduktionsleistung und nutzungsdauer von häsinnen - 197 Weiße Pannon Häsinnen wurden entsprechend der Anzahl ihrer Würfe (A = 1-3, B = 4-6, C = 7-9, D = mehr als 9) und ihrer Nutzungsdauer (unter 0.5, 0.5-1, 1-1.5, 1.5-2, über 2 Jahre) gruppiert. Es wurde festgestellt, daß die Häsinnen mit einer überdurchschnittlichen Leistung in frühen Jahren eine längere Nutzungsdauer hatten. Unserer Meinung nach ist das hohe Leistungsniveau im frühen Alter eine Folge der Konstitution, und die gesünderen Häsinnen mit besserer Konstitution beenden auch später ihr produktives Leben.
