

Analysis of Reproductive Traits of Giant Broiler Rabbit Lines

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Abstract

The aim of this study was to evaluate chosen reproductive traits of synthetic broiler rabbit line. The numbers of 7 reproductive traits were analysed. The synthetic broiler rabbit lines produced from local broiler population and Belgian Giant White sire rabbit were the object of analysis in our study. Number of total born young, lactation at 21st day, number of weaned (35), mortality and relative mortality, litter weight at birth and litter weight at weaning were analysed in experiment. The experiment was carry out in intensive farm conditions with controlled microclimate in wire cages, fed with balanced granulated mixture. Reproduction was provided by artificial insemination, heating and ovulation were stimulated by exogenous hormones. Kindlings were spontaneous and regulated lactation was applied. Following obtained values of analysed lines are presented in results. The average of total number of born in lines F1, B1, B2, B2.1 were 7.9; 9.08; 10.25 and 7.75 respectively. Weaning was carry out at the age of 35 days, and the average numbers of weaned young were: 6.35; 7.75; 8.85; 5.25. The mortality up to weaning reach average numbers 1.55; 1.08; 1.5; 2.5 pieces and 18.42; 15.13; 13.97; 33.72 %. The weights of litter at born reach values 240 -- 955 g. The weight of litter at weaning in each line was 4876.25; 5940.5; 7165; 4471.88 g. Lactation at 21th day reaches average numbers 3257.25; 6837.5; 4511.0; 3707.5 g.

Key words: broiler rabbit, giant line, reproductive traits

1. Introduction

Reproductive stage of broiler rabbit production presents the very important factor of production. The optimal number of offspring manage sufficient effectivity of herd and reduce the physiological exhausting of does. The number of born youngs is specific value of each specie [1]. The litter size at born belongs to the most important selection criterion of synthetic maternal lines [2-4]. Reproductive traits of does are influenced by physiological condition of doe, breeding conditions, nutrition, health and breeding technology [5] age [6] or photoperiod [7]. Selection and selection methods in maternal lines are very

complicated comparing to sire lines, due to the fact, that coefficients of heritability are low [8] and generation intervals are longer in maternal lines comparing to paternal lines [9]. One of the most important selection method in maternal lines is selection for uterus capacity [10]. That method is widely accepted and practised in broiler rabbit hybridization [11]. All that authors [9, 10, 11] present results, that the number of born youngs is positively correlated with uterus capacity. [12] states that, the number of born rabbits varies in broiler rabbit hybridization programmes on grade 9 – 10 pieces. Slightly smaller values presents [13] that found out 5.2 – 8.1 pieces of born in synthetic line. [14] marked in meat rabbit population values 7.6 – 10.5 pieces. [15] find out in crosses of NZW and Cal 9.01 – 10.10 pieces. In pure bred NZW was obtained an average number of born 7.99 [16]

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or 6.49 in an others studies and in Cal 7.26 [17]. The mortality up to weaning is reproductive factor that is considered to be an express of individual maternal traits. There occurs also small and physiologically undeveloped individuals in the litters of high number of born and these animals have often alimentary troubles causing, low vitality and mortality [18]. High correlation of mortality to live weight at born proves the work of [19]. Preweaning mortality is especially during the first week of life [20-22]. [23] found out the mortality in broiler rabbits 6.94 – 22.5 % [15] presents the average mortality in Cal and NZW rabbits 16.1%. [24] found out mortality in local synthetic line 5 – 15 %. The litter size at weaning is the trait that is influenced mainly by previous parameters and presents very important economic indicator of production. The average numbers of weaned offspring in Cal and NZW rabbits was 5.69 and 6.49, respectively [17]. The same breed (NZW) reached in intensive farming conditions 7.0 – 7.6 youngs [25]. But the crosses of named breeds reached expressive higher values 8.63 – 10.1 of weaned rabbits per litter [15]. The synthetic meat lines reach the average numbers of weaned young 6.1 – 8.1 pcs per litter [14]. [26] find out the average number of weaned rabbits of Hyplus genotype 6.57; 7.46 and 7.48 in lines GD54, GD14 and PS19 respectively. No influence of sire line on number of weaned or number of born rabbits was proved [8]. The factors most influencing milk production are follows : breed [27-29], number of suckling offsprings [30] live weight of doe [17], doe nutrition [31, 32] and individual property of doe. Milk production is the only factor influencing the growth rate of suckling offsprings [33]. The average daily milk production of rabbit doe varies from 136.7 to 157.6 g in meat rabbits [17]. The maximal of milk production reach the doe at about 21st day after kindling. Maximal daily production presents 200 – 250 g of milk [34]. Maximal volume of milk production reached by the does of meat breed from 18th to 22nd day after kindling [17, 29, 35, 36]. The total milk production up to the 21st day should reach minimum 3900 g [12]. Depending on lactation system, the total value of milk production may reach 4593 – 5090 g [37] or 3232 – 4070 g [34] in meat rabbit breeds. The aim of this study was to evaluate and to compare some reproductive traits of giant rabbit lines with different ratio of giant breed.

2. Materials and methods

Animals

Animals analysed in the study presents four generations, which was created during hybridization of standard local synthetic broiler line and sire of Belgian Giant White. The lines F1, B1 and B2 were created as following generation with 50, 25 and 12.5 % of sire breed BGW and the last generation B2.1 was created as inter se crosses of line B2. All animals were albinotic.

Housing system

Wire cages technology, with automatic drinking system and pelleted mixture diet was used. Drinking and feeding was served ad libitum. Animals were hold in room with controlled microclimatic conditions.

Table 1. Composition of feeding mixture

Crude protein	Energy	Crude fibre	Fat	Dry matter
16 %	0.8 MJ/kg	14 %	4.5 %	88 %

Analysed traits and data collection

Litter size at born (Lb) - Total number of all born youngs in one litter were monitored after kindling.

Milk production (Mp) – production of milk from one doe, up to 21st day after kindling. That trait was count as:

$$L_{21} = 2 * (m_{21} - m_0)$$

L_{21} – milk production up to 21st day

m_{21} – litter weight at 21st day after kindling

m_0 – litter weight at born

Litter size at wean (Lw) – number of all youngs weaned from one doe at 35st day of age

Mortality (M) – number of perished animals up to weaning

Relative mortality (Rm) – percentage of perished youngs that was count as:

$$Rm = 100 * M / Lb$$

Litter weight at born (Lwb) – the weight of all youngs from one doe measured after kindling

Litter weight at wean (Lww) – the weight of all youngs weaned from one nest at the age 35 d

Data analyses

Statgraphic Centurion programme was use for data analyses. Descriptive statistics were calculated for each group and age. Kruskal – Wallis test was used to determine the significance of differences between analysed lines.

3. Results and discussion

The results of the studied lines are presented as means and SD in table 2. One of the most important reproductive traits is the number of

born rabbits. This trait is considered to be dependent on individual or breed genetic performances [12, 15].

Table 2. Means, SD and statistical significance of analysed lines

	F1	B1	B2	B2.1
Lb [pcs]	7.90 ± 1.71 ^a	9.08 ± 2.15 ^{ab}	10.25 ± 0.96 ^b	7.75 ± 1.66 ^a
Mp [g]	3257.25 ± 1074.75 ^a	4316.67 ± 1790.42 ^b	4511.00 ± 1067.12 ^b	3707.50 ± 1314.64 ^{ab}
Lw pcs]	6.35 ± 2.00 ^{ab}	7.75 ± 2.22 ^{bc}	8.75 ± 1.42 ^c	5.25 ± 2.54 ^a
M [g]	1.55 ± 1.87 ^a	1.08 ± 0.99 ^a	1.5 ± 1.5 ^a	2.5 ± 2.44 ^a
Rm [%]	18.42 ± 21.56 ^{ab}	15.13 ± 13.15 ^a	13.97 ± 13.87 ^a	33.72 ± 29.62 ^b
Lwb [g]	534.47 ± 162.51 ^a	660.50 ± 84.60 ^b	755.83 ± 139.88 ^b	466.25 ± 132.11 ^a
Lww [g]	4876.25 ± 1651.85 ^a	5940.75 ± 2096.68 ^{ab}	7165.00 ± 1846.40 ^b	4471.88 ± 2078.61 ^a

Means values with different letters, in the same line, showed a statistical significance of $P \leq 0.05$

Values with significant differences were found out in our study. The average value varies from 7.75 to 10.25 of newborn youngs. Our results are in correspondence with notes of [16] that presents average number of born rabbits 7.99 in NZW rabbits in conventional conditions. [38] find out in two different genotypes of synthetic broiler lines average number 9.95 of youngs. Comparing our values with previous results we can note, that reproductive traits of our lines create conditions for possibility to apply these genotypes as useful material for next hybridization or production. The milk production reached variable values with significant differences between genotypes. This trait is highly correlated with number of born and number of weaned offspring [31, 32]. Increasing trend of milk production was recorded in relationship to decreasing of giant breed ratio in genotype of line. But the final generation as a product of inter se mating show the lowest values in all parameters. The values obtained in our study varied from 3257 to 4511 g of milk produced up to 21st d. Our values are slightly lower to [37] but we reached higher values like [34]. However our numbers present common numbers of that trait comparing to results presented for crosses of standard meat rabbits in farming conditions. Lw presents one of the most important productive trait. The values of our study show close relationship to the Lb trait,

though this trait is much influenced especially by mortality. Values of experimental lines reached 6.35; 7.75; 8.75 and 5.25 pcs for F1, B1, B2 and B2.1, respectively. The average numbers of weaned rabbits presents 5.69 [17], 7 – 7.6 [25] or 8.6 to 10.1 [15] in meat breeds and their crosses. [26] find in population of Hyplus genotype similar results. Our results come under the interval presented above. As for results recorded in mortality, more important is relative mortality. This parameter is influenced not only by maternal properties of doe, but breeding technology affect is as well. No differences were obtained as for number of perished youngs up to weaning. Rm shows differences as table 2 presents. The most of authors presents the level of relative until weaning mortality up to 20 per cents [15, 23, 24]. Our results present similar results, besides the line B2.1, where the relative mortality reached 33.72 % which presents really high number. According to the fact, that all lines were hold in identical condition, the influence of housing system and breeding technology is irrelevant. Lwb shows significant differences between the lines. This trait is not influenced by breeding conditions, so the differences are considered to be caused by genetics. This trait is again closely correlated to Lb. The mean values of each line are shown in table 2 and comparing with results of [39] who count average value 624.24 g in synthetic giant line our results are

almost similar. Lww is affected with Lb and Lw especially. Our values reached 4876.25; 5940.75; 7165.00 and 4471.88 for F1, B1, B2 and B2.1 respectively. The highest production reached the line B2 and vice versa the lowest value reached the line B2.1, which presents inter se crosses of B2. All of the parameters analysed in this study are in a very close relationship and affected especially by the genetic and individual performances of doe, besides the mortality that is influenced partially also by breeding conditions. Each following generation from F1 to B2 showed an improvement of analysed reproductive traits, but the final generation shows express decreasing of productive parameters.

4. Conclusions

All results presented in this study proves common level of analysed characteristics comparing to results of other authors. All lines and reproductive traits of this study reach similar values, like presented in different genotypes. As for lines comparison, in all traits were found out significant difference between lines, besides the number of perished youngs until weaning. Gradual improvement of production traits (Lb, Mp, Lw, Lwb and Lww) was recorded in lines F1, B1 and B2, line B2.1 contrary shows the smallest values of analysed traits. Vice versa the Rm shows decreasing of value gradually with following generations, besides B2.1. We can note that decreasing of giant breed ratio caused partially improvement of monitored traits.

Acknowledgements

This study was financially supported by the VEGA grant, Ministry of Education, Science, Research and Sport of the Slovak Republic No. 1/0511/15.

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