



## **PROCEEDINGS OF THE 12<sup>th</sup> WORLD RABBIT CONGRESS**

Nantes (France) - November 3-5, 2021

ISSN 2308-1910

### Session **REPRODUCTION**

***Machado L.C., Faria C.G.S., Zeferino C.P., Castilha L.D.,  
Silveira J.M.M., Silva V.G.P., Pereira D.L.***

**PRODUCTIVE, REPRODUCTIVE, BEHAVIORAL AND SANITARY ASPECTS  
OF RABBIT DOES FROM DIFFERENT GENOTYPES**

**Full text of the communication**

+

**Poster**

#### *How to cite this paper*

Machado L.C., Faria C.G.S., Zeferino C.P., Castilha L.D., Silveira J.M.M., Silva V.G.P., Pereira D.L., 2021. Productive, reproductive, behavioral and sanitary aspects of rabbit does from different genotypes. Proceedings 12th World Rabbit Congress - November 3-5 2021 - Nantes, France, Communication R-14, 4 pp.+ presentation

## **PRODUCTIVE, REPRODUCTIVE, BEHAVIORAL AND SANITARY ASPECTS OF RABBIT DOES FROM DIFFERENT GENOTYPES**

**Machado L. C.<sup>1</sup>, Faria C. G. S.<sup>2</sup>, Zeferino C. P.<sup>3</sup>, Castilha L. D.<sup>4</sup>,  
Silveira J. M. M.<sup>2</sup>, Silva V. G. P.<sup>2</sup>, Pereira D. L.<sup>2</sup>**

<sup>1</sup>Federal Institute of Minas Gerais (IFMG), Bambuí-Medeiros Highway, km 05, Bambuí, Brazil.

<sup>2</sup>Animal Science Students of IFMG

<sup>3</sup>Brasil University, Descalvado, Brazil

<sup>4</sup>Maringá State University, Maringá, Brazil

\*Corresponding author: [luiz.machado@ifmg.edu.br](mailto:luiz.machado@ifmg.edu.br)

### **ABSTRACT**

In order to compare the productive and reproductive performance, also behavioral and sanitary aspects, 27 rabbits does were used for this study, totalizing nine from the New Zealand White breed, nine from Botucatu genetic group and nine crossbreds. In general, the results showed that rabbit does from New Zealand White breed required fewer number of inseminations to achieve a positive pregnancy, but presented lighter kits during lactation ( $P < 0.05$ ). Botucatu genetic group showed high weight of their kits during lactation. However, there was high elimination rate of these rabbit does and it needs to be further evaluated. Crossbred does provided more kindlings and weaned kits, as well as, higher feed intake. The use of crossbreds from the New Zealand White and Botucatu is indicated in Brazilian rabbit farms. New studies evaluating the longevity of rabbit does under Brazilian conditions need to be performed.

**Key words:** rabbit breeding, Botucatu, crossbreed, heterosis

### **INTRODUCTION**

Considering the range of products and services that can be obtained from commercial exploitation, rabbits are the most versatile domestic animal. In order to be competitive and improve the production rates, it is important to develop new genotypes that are better adapted to the farm conditions. Unlike in Europe, where highly selected commercial breeds are used for greater prolificacy and productive performance, only traditional breeds are used in Brazil, and only few breeders work efficiently with crossbred does. Moura et al. (2001) point out that in countries, where rabbit breeding has not yet reached a high level of organization, the development of a multiple-proposal genetic line through multiple selection for prolificacy and growth rate may be an important alternative. In this sense, Botucatu genetic group has been developed in Brazil from meticulous genetic improvement (Moura, 2000), and few studies have evaluated its reproductive performance compared to other breeds or possible crosses.

This study evaluated the productive and reproductive performance, also behavioral and sanitary aspects in New Zealand White (NZW), Botucatu (BOT) and crossbred (CRO: NZW and BOT) rabbit does in order to indicate the best genotype for use in Brazilian farms.

### **MATERIALS AND METHODS**

#### **Animals and experimental design**

The study was performed from November 2018 to May 2019. The approval of the Animal Ethics Committee (CEUA-IFMG) was registered under number 01/2018. The average daily temperatures

were 19.6 and 30.3 °C (minimum and maximum, respectively). Twenty-seven rabbit does were used, totaling nine from each genotype. At 158 days of age, they were artificially inseminated (AI). The NZW does received NZW semen and the others received BOT semen. The pregnancy diagnosis was conducted on the 12th day after insemination and empty does received a new AI dose, at 21st day after the previous attempt. The cage was equipped, three days before kindling, with an externally box-type nest containing grass straw. All does were fed with a balanced commercial feed containing 17.7% of CP, 17.2% of ADF and estimated 2450 kcal DE per kg. It was provided 150g of feed per day for does without kits or until 20<sup>th</sup> pregnancy day and *ad libitum* from the final third of pregnancy (day 21) and throughout all lactation period.

Does were evaluated until the third productive cycle, with discards (three unsuccessful AI, occurrence of serious illness or death). A total of 62 kindlings were considered. Litter size was standardized at eight kits per doe. The interval between kindlings was 42 days (31+11), except for primiparous does who were inseminated only after the first weaning which occurred at 32 days of lactation. All does were weighed at 119 and 158 days (first insemination). For productive and reproductive performance, it was noted the number of: alive born kits (ABK), dead born kits (DBT), total born kits (TBK), standardized litter size at birth (SLS), litter size at 18 (LS18) and 32 (LS32) days of lactation, total weight of alive born kits (WAK) and total weight of all born kits (ABK), average weight of alive born kits (AWK), weight of does after kindling (DW0) at 18 (DW18) and 32 (DW32) days of lactation, litter weight at 18 (LW18) and 32 (LW32) days and does feed intake in the periods 0-18 (FI0-18) and 18-32 (FI18- 32) days of lactation. Nesting and calving ability (NCA - zero to four scale), aggressiveness (AGR - zero to three scale), occurrence of pododermatitis (POD - zero to three scale) and occurrence of scabies (SCA) were also evaluated.

### **Statistical Analysis**

All productive and reproductive traits considered the order of the cycle (first, second or third). For DW0, DW18, DW32, LW18, LW32, LS18, LS32, FI0-18 and FI18-32, it was considered the day or period. Qualitative traits of NCA, AGR and POD considered the highest values in each cycle. For SCA, the number of sarnicide applications was added within each cycle. ANOVA was performed and the means were compared by Tukey test at 5% probability level, using the Statgrafics Centurion program. For the qualitative traits, only descriptive comparisons were performed.

## **RESULTS AND DISCUSSION**

Ten does were eliminated or lost during the experimental period (six from Botucatu genetic group). Longevity is one of the most important traits in rabbit breeding, and it is extremely important that does may produce during large numbers of cycles in their reproductive life. The growing does presented similar weight at 119 and 156 days of age ( $P < 0.05$ ). All groups reached a minimum weight of 4 kg at 156 days, thus allowing mating or AI at 22 weeks of age. However, after the first kindling, BOT and CRO rabbits are heavier (Table 1).

When used AI in farms, it is crucial that the does get pregnant easily. In this sense, the NZW group stood out from the others. It was very easy for all groups to reach a positive pregnancy in the first insemination, which is mainly due to the season (November/December). This seasonal effect was also verified by Moura et al. (2003). In Brazil there are no light programs for rabbits during different photoperiods.

**Table 1-** Productive and reproductive performance of rabbit does from different genotypes during three reproductive cycles.

Traits	Genotypes					
	NZW	se	BOT	se	CRO	se
Insemination attempts	1,10a	0,10	1,50b	0,15	1,42b	0,10
Number of alive born kits	7,75	0,72	7,58	1,06	7,33	0,68
Number of dead born kits	1,13	0,46	0,42	0,67	0,44	0,43
Number of total born kits	8,52	0,72	8,00	1,06	7,77	0,69
Total weight of alive born kits (g)	391,3	30,0	477,0	44,2	421,0	28,6
Average weight of alive born kits (g)	54,4ab	2,70	62,6ab	3,97	63,0b	2,57
Weight of does after kindling (g)	4190,6a	59,8	4290,0ab	87,3	4407,7b	58,7
Weight of does at 18 <sup>th</sup> day of lactation (g)	4520,2a	80,6	4849,0b	109,1	4898,9b	70,5
Weight of does at 32 <sup>th</sup> day of lactation (g)	4451,6a	82,4	4704,3b	107,2	4703,3b	70,72
Standardized litter size at birth	7,76	0,41	7,54	0,59	7,13	0,38
Litter size at 18 <sup>th</sup> day of lactation	6,18	0,47	5,46	0,60	5,78	0,39
Litter size at 32 <sup>th</sup> day of lactation	5,90	0,46	5,38	0,59	5,53	0,38
Litter weight at 18 <sup>th</sup> day of lactation (g)	1649,9	125,8	1669,4	162,1	1644,6	104,7
Litter weight at 32 <sup>th</sup> day of lactation (g)	3720,0	308,0	4298,8	396,6	3985,1	256,2
Does feed intake in the period 0-18 days (g)	322,9ab	10,55	299,3a	13,59	343,9b	8,78
Does feed intake in the period 18-32 days (g)	424,1a	18,82	499,8b	24,48	453,6ab	15,65

NZW: New Zealand White breed, BOT: Botucatu genetic group and CRO: crossbreed (NZW x BOT) rabbits, se: standard error.

<sup>a,b</sup> Values in the same row with different superscripts are statistically different ( $P < 0.05$ ).

There was similarity between the groups for ABK, DBT and TBK ( $P > 0.05$ ). In general, the ABK results (7.6 kits) are expected, being superior to Moura et al. (2003), Jaouzi et al. (2004) and Machado et al. (2007) and similar to Mugnai et al. (2009). However, when compared to data obtained by Machado et al. (2019), the values are lower, evidencing the need to improve the general conditions of Brazilian rabbit breeding (Machado, 2018). Although there are considerable numerical differences, no statistically significant differences ( $P > 0.05$ ) were observed for WAK and ABK, mainly due to the high variability of these parameters. When analyzed the AWK, it is clear that BOT and CRO does tend to give birth to heavier kits. High AWK values are interesting considering the direct relationship that this characteristic has with slaughter weight and inverse relationship with mortality (Poigner et al., 2000). However, very high values are reached when the litter size is lower, which is an undesirable situation in the rabbit farm.

No significant differences ( $P > 0.05$ ) were observed for SLS, LS18 and LS32 (Table 01). However, there are differences between the reproductive cycles where the first presented the best results. This is due to the fact that there were more rabbits available to standardize the litter at eight kits during the first kindling. This was also reflected in the cycles, where the first presented heavier litters at weaning (4671.4g vs 3698.4g vs 3634.1g for cycles one, two and three, respectively). In general, the average number of 5.6 kits per litter is within the expected range in Brazilian conditions, being higher than that found by Machado et al. (2007), similar to Moura et al. (2003), Jaouzi et al. (2004) and Mugnai (2009) and inferior to Oliveira et al. (2017). When compared to some European experiments conducted in recent years, the results obtained in the present study are worse and not expressive. Cervera et al. (2017) and Machado et al. (2019) found the respective values of 10.0 and 9.5 weaned kit per doe. This emphasize the need to improve the rabbit doe's management, equipments, as well as, the environmental conditions of the Brazilian farms. Moreover, this fact corroborates the idea that one of the biggest problems in Brazilian rabbit breeding is still the high mortality of pre-weaning kits (Machado, 2018). CRO does provided more kindlings throughout the experiment (25, 23 and 14 for CRO, NZW and BOT respectively) and thus provided more weaned kits (141, 112 and 87 for CRO, NZW and BOT respectively) being this situation also verified by Jaouzi et al. (2004). No significant differences were observed for LW18 and LW32 ( $P > 0.05$ ). Regarding the feed intake of does, there is great variation among the data. In the 0-18 period, CRO and NZW does have higher feed intake. In the following period, BOT and CRO could achieve similar values. High feed intake is fundamental for heavier kits at weaning, also raised number of kindlings per doe annually, and improved longevity of does. However, it is one of the characteristics that are most influenced by the environment.

All genotypes have high capacity for NCA (Table 02). The occurrence of aggressive behavior seems to be higher in the BOT group. During the experimental period, there was low occurrence of POD, which was observed mainly during the first cycle, being controlled in second cycle. The occurrence of scabies is high and suggests greater resistance of the BOT.

**Table 02** – Behavioral and sanitary scores of rabbit does from different genotypes during three productive cycles\*\*\*

Qualitative traits*	Genotypes		
	NZW	BOT	CRO
Nesting and kindling abilities	3,8	3,7	3,8
Aggressiveness	0,2	0,7	0,2
Occurrence of pododermatitis	0,5	0,4	0,2
Applications of sarnicide **	1,7	0,6	1,4

\* For nesting and calving abilities, a value was considered for each kindling of each doe. For aggressiveness and pododermatitis, the highest values observed in each productive cycle were considered.

\*\* The sarnicide applications were added within each cycle.

\*\*\* All values presented in this table are averages of the data obtained in the three productive cycles.

NZW: New Zealand White breed, BOT: Botucatu genetic group and CRO: crossbreed (NZW x BOT) rabbits.

## CONCLUSIONS

In general, the NZW breed were distinguished by the lower number of inseminations in order to achieve a positive pregnancy, but presented lighter kits during lactation. The BOT showed high weight of their kits, from birth to weaning. However, the high elimination rate of these does needs to be further evaluated. Crossbred does provided more kindlings and more weaned kits, as well as, higher feed intake. The use of crossbreds is indicated in Brazilian rabbit breeding. New studies evaluating the longevity of does under farm conditions need to be performed.

## REFERENCES

- Cervera C., Martinez-Peredez E., Machado L. Villagra A. Producción de conejas en sistemas de alojamiento individual o colectivo en semigrupo. In: *Actas del 42° Simposium de Cunicultura, 2017, Murcia, España, 107-110*
- Jaouzi T., Barkok A., Bouzekraoui A., Et Bouymajane Z. Evaluation of some production parameters in rabbit. Comparative study of local morocca rabbit and Californian breed in pure and cross breeding In: *Proc. 8<sup>th</sup> World Rabbit Congress, 2004, Puebla, Mexico, 1194-1201*
- Machado L. C., Ferreira W. M., Faria H. G., Scapinello C., Alves C. S. A. 2007. Avaliação da dieta simplificada com base em feno de alfafa para coelhas reprodutoras. *Vet. Zootec.*, 14, 291-299.
- Machado L. C. 2018. Opinião e atualizações: Uma reflexão sobre as causas da elevada mortalidade pré-desmame no Brasil. *Boletim de Cunicultura*, 11, 6-7. Available in: [http://acbc.org.br/site/images/Boletim\\_11.pdf](http://acbc.org.br/site/images/Boletim_11.pdf)
- Machado L. C., Martinez-Peredes E., Cervera C. 2019. Performance of rabbit does housed in collective pens and individual cages. *World Rabbit Sci* 27(4), 227-235.
- Moura A.S.A.M.T., Polastre R., Wechsler F.S. 2000. Dam and litter inbreeding and environmental effects on litter performance in Botucatu rabbits. *World Rabbit Sci.*, 8, 151 – 157.
- Moura A. S. A. M. T., Costa A. R. C., Polastre R. 2001. Variance componentes and response to selection for reproductive, litter and growth traits through a multi-purpose index. *World Rabbit Sci.*, 9, 77-86.
- Moura A. S. A. M. T., Fernandes S., Vasconcelos J. L. M., Bianospino E. 2003. Bioestimulação da atividade reprodutiva de coelhas lactantes em regime de monta natural. *Rev. Bras. Zootec.*, 32, 315-324.
- Mugnai C., Dal Bosco A., Castellini C. 2009. Effect of different rearing systems and pre-kindling handling on behavior and performance of rabbit does. *Applied Animal Behaviour Science*, 118, 91-100.
- Oliveira M. C., Lima S. C. O., Mesquita S. A., Silva J. A., Gomes Y. S., Attia Y. A., Oliveira H. C. 2017. Short Communication: Nesting materials for does: Effect on nest building and performance at first parturition. *Rev Colomb Cienc Pecu.*, 30, 308-315.
- Poigner J., Szendro Z., Levai A., Radnai I., Biro-Nemeth E. 2000. Effect of birth weight and litter size on growth and mortality in rabbits. *World Rabbit Sci.*, 8, 17-22.

# Productive, reproductive, behavioral and sanitary aspects of rabbit does from different genotypes

Machado L C\*, Faria C G S, Zeferino C P, Castilha L D,  
Silveira J M M, Silva G P, Pereira D L  
E-mail: [\\*luiz.machado@ifmg.edu.br](mailto:luiz.machado@ifmg.edu.br) . IFMG-BRAZIL



**Context:** In developing countries new genotypes need to be evaluated and applied to farm conditions. The Botucatu rabbits are the only Brazilian genotype and its crossings with other breeds need to be evaluated.

**The question:** Are Botucatu rabbit does better than New Zealand White (NZW) does or than their crossbreeds?

**Methods :** 9 Botucatu does, 9 NZW does and 9 crossbreeds, during three 42 days reproductive cycles (a total of 62 kindlings). NZW received NZW semen and the others received Botucatu semen, using artificial insemination.

**Results :** 10 does were eliminated or lost (six from Botucatu)

we need to look for a **better longevity**

Traits	Genotypes					
	NZW	se	BOT	se	CRO	se
Insemination attempts	1,10a	0,10	1,50b	0,15	1,42b	0,10
Average weight of alive born kits (g)	54,4ab	2,70	62,6ab	3,97	63,0b	2,57
Weight of does after kindling (g)	4190,6a	59,8	4290,0ab	87,3	4407,7b	58,7
Weight of does at 18 <sup>th</sup> day of lactation (g)	4520,2a	80,6	4849,0b	109,1	4898,9b	70,5
Weight of does at 32 <sup>th</sup> day of lactation (g)	4451,6a	82,4	4704,3b	107,2	4703,3b	70,72
Does feed intake in the period 0-18 days (g)	322,9ab	10,55	299,3a	13,59	343,9b	8,78
Does feed intake in the period 18-32 days (g)	424,1a	18,82	499,8b	24,48	453,6ab	15,65

Qualitative traits*	Genotypes		
	NZW	BOT	CRO
Aggressiveness	0,2	0,7	0,2

## WEANED KITS:

141, 112 and 87 for CRO, NZW and BOT respectively

### In general

- NZW does: less insemination attempts but lighter kits
- Botucatu does: higher aggressiveness and high lost rate
- Crossbreed: more kits, better feed intake and good growing rate

**Take home message : Brazilian rabbit breeding needs to use crossbreed does to improve the rabbits performance**