

# Clinical, zootechnical and behavioral evaluation of litters of dogs born in the guide dog program of the 'Instituto Federal Goiano', Campus Urutaí, Brazil

Laura Bruna Aparecida Silva<sup>1\*</sup>, Brunno Moreira Naves<sup>1</sup>, Kellen de Souza Oliveira<sup>2</sup>, Rosângela de Oliveira Alves Carvalho<sup>2</sup>, Adriana Santana do Carmo<sup>2</sup>, Saulo Humberto de Ávila Filho<sup>1</sup>

<sup>1</sup> Instituto Federal Goiano - Campus Urutaí. Rodovia Geraldo S. Nascimento, Km 2.5, 75790-000, Urutaí, GO, Brazil.

<sup>2</sup> Universidade Federal de Goiás. Escola de Veterinária e Zootecnia - Campus Samambaia. Rodovia Goiânia - Nova Veneza, Km 8, 74690-900, Goiânia, GO, Brazil.

\*Corresponding author. E-mail: [laura.bruna@estudante.ifgoiano.edu.br](mailto:laura.bruna@estudante.ifgoiano.edu.br)

**ABSTRACT.** The Brazilian population with low vision or blindness is approximately six and a half million people. This scenario is intricate because of the existence of only six Guide Dog Training Centers and, consequently, few Guide Dogs performing the role of assistive therapy as a guide for blind people in Brazil. The objective was to comparatively characterize the clinical, zootechnical, and behavioral profile of three litters of dogs born at the Guide Dog Training Center of the Federal Institute of Goiás, Campus of Urutaí, Brazil, from conception to the forty-ninth day of life. The number of live births, stillbirths, average daily weight gain, the incidence of congenital diseases, and acquired diseases were surveyed. The performance of puppies obtained in the Volhard and Behavior Checklist tests was also obtained. Litter B presented higher stillbirths. A higher average daily weight gain was also observed in litter B and, consequently, a higher weight of pups at all evaluation moments. Litter E differed from the others regarding the behavioral parameters, showing better results in terms of hyper-attachment, fear of strangers, and anxiety in unknown places. Therefore, a difference was observed between litters regarding the evaluated zootechnical and behavioral aspects. Furthermore, an evolution was observed over time, with the last litter, whose parents were animals from the kennel, presenting the best behavioral profile.

**Keywords:** Blind, cynophilia, visual impairment, Labrador Retriever, assistive technology.

DOI: <https://doi.org/10.33837/msj.v4i1.1512>

Received Aug. 10, 2021. Accepted Oct. 14, 2021.

Associate editor: Anderson Rodrigo da Silva

## INTRODUCTION

According to the 2010 Brazilian Census, Brazil has about 45.6 million people with some type of visual impairment. Of these, about six million have low vision and 528,000 are blind. Regarding visual impairment, the main causes of blindness consist of retinopathy of prematurity (21.0%), optic nerve atrophy (18.0%), congenital glaucoma (16.0%), retinal dystrophies (11.0%), and neoplasia (8.0%). In contrast, the causes of low vision include congenital cataract (18.0%), congenital glaucoma (15.0%), and retinoblastoma (12.0%) (Junior & Oliveira, 2016).

Regardless of the cause, visual acuity loss can negatively affect the quality of life, often **interfering** with financial, social, psychological, sanitary, and

physical aspects of people with low vision or blindness (IBGE, 2010). Knowing this and considering the high number of people with severe visual impairment in the Brazilian population, there is an increasing need to develop assistive technologies to help the inclusion and integration of visually impaired people into society (Chelini & Otta, 2016).

Assistive therapies using animals have been used in Brazil to mitigate accessibility difficulties, the right to come and go, and increase the social inclusion of Brazilian citizens with some type of disability (Chelini & Otta, 2016). Guide dogs are part of this set of assistive technology, as they can guarantee mobility and independence to people with special needs, whether blind or visually impaired, helping their inclusion and integration into society.

Currently, only six Training Centers are operating in Brazil and just over 180 guide dogs are working. These quantities are very small considering the number of visually impaired people in the country. These Training Centers are ultimately responsible for training and instructing the User/Guide Dog pair. However, several activities must take place for this

Copyright © The Author(s).

This is an open-access paper published by the Instituto Federal Goiano, Urutaí - GO, Brazil. All rights reserved. It is distributed under the terms of the Creative Commons Attribution 4.0 International License.



pair to be formed, such as reproductive, sanitary, zootechnical, and behavioral management, obedience training, desensitization, socialization, functional training, and training and instruction of the User/Guide Dog pair (Nunes, 2019).

The small number of Guide Dog Training Centers culminates in a small supply of Guide Dogs in Brazil and a reduced production of scientific studies carried out with the dog population, which would provide relevant technical information to improve rearing, training, and formation of this assistive technology. Thus, a vicious cycle is created, hindering the care, integration, and inclusion of people with severe visual impairments and blind into Brazilian society.

The objective was to comparatively characterize the clinical, zootechnical, and behavioral profile of dogs from three Labrador Retriever litters born at the Guide Dog Training Center of the Federal Institute of Goiás, Campus of Urutaí, Brasil, from conception to the forty-ninth day of life.

## MATERIAL AND METHODS

The activities were carried out at the Guide Dog Training Center, located at the Federal Institute of Goiás, Campus of Urutaí, Goiás, Brazil. Data from 24 Labrador Retriever puppies from three litters born in the kennel, called litter B, C, and E, were collected. Litter E had parents from the kennel, the dam named Beiju (litter B), and the sire named Carajá (litter C).

The management of dogs (sires, dams, or puppies) was carried out equally in accordance with the technical recommendations of the technical responsible for the Training Center, even for different litters. All animals had a prophylactic calendar consisting of vermifuges and vaccines (multiple, anti-rabies, against giardiasis, and against *Bordetella bronchiseptica*). Furthermore, all animals were medicated with a fluralaner-based insecticide against ticks every three months.

The pregnant dog was sent to the Maternity Kennel one week before the expected birth date, in the peripartum period, where it remained until the pups were weaned. In this kennel, the lactating dog was fed twice a day with the dry food Royal Canin Medium Junior®, totaling 450 g daily, as suggested by the manufacturer. The amount of feed during the postpartum period was adjusted according to the week of lactation and the number of live puppies, using the Equation 1, where ME is the metabolizable energy (kcal/day), BW is the body weight, n is the number of puppies from 1 to 4 animal units, m is the number of puppies from 5 to 8 animal units, and L is the correction factor for the lactation stage (1 to 4 weeks), that is, 0.75, 0.95, 1.1 and 1.2, respectively.

$$ME = 145BW^{0.75} + BW(24n + 12m)L \quad (1)$$

The puppies were born in the Maternity Kennel. Extraordinarily, the puppies of litter E were born in the home environment of its dog owner, but they received the same care regarding the needs of the litters. All newborns ingested colostrum within the first 12 hours of life. Moreover, assisted breastfeeding every three hours until completing 21 days of life was guaranteed to the newborns. After this period, the dry food Royal Canin Medium Junior® rehydrated in hot water was offered to the animals in addition to the milk, with a frequency of three times a day and ad libitum. The puppies received more and more feed from the thirtieth to the fortieth day of life, reducing the breastfeeding to complete weaning by the end of this period.

The first and second dewormer doses were applied on the 15th and 30th days of life, respectively. The vaccination protocol started on the 45th day of life with the multiple vaccine application and, subsequently, the vaccination schedule was completed as directed by the Veterinarian. In addition to prophylactic sanitary management, five-minute desensitization massages for each pup were implemented twice a day in their second week of life. Sound, visual, and tactile stimulations were also added during the puppy desensitization.

The moments before delivery were of paramount importance, with monitoring and collection of clinical and zootechnical data for each newborn. The number of live births, neonatal mortality, weight at birth, weight at seven and 14 days after birth, and average daily weight gain on the 18th day of life were obtained. The puppies were weighed using a digital scale.

Regarding the clinical data, the information on congenital and acquired diseases up to the 45th day of life of the puppies along with their medical records was searched at the Veterinary Clinic of the Guide Dog Program of the Federal Institute of Goiás, Campus of Urutaí.

Behavior Checklist and Volhard tests (supplementary files A and B) were used for the behavioral evaluations. The evaluations of the Volhard test were carried out on the 49th day of life of the puppies, and the mode obtained among all the variables of each puppy was used. Moreover, the Behavior Checklist was performed between the sixth and seventh week of the puppy's life, in which some variables were chosen and the puppy performance was scored for each of them, as follows: 0 - absent; 1 - very slight; 2 - slight; 3 - moderate; and 4 - severe. The median of each variable was used as a criterion for comparing litters.

The data collected in this study were compared between litters and statistically evaluated. In this sense, descriptive statistics was used, and the litters were compared by the Kruskal-Wallis test for non-parametric variables or one-way analysis of

variance for parametric variables, whenever necessary. All tests were carried out at  $p < 0.05$  using the R software.

## RESULTS AND DISCUSSION

Overall, clinical, zootechnical, and behavioral data were collected from 24 puppies. The clinical data obtained from puppies of litters B, C, and E are first reported. Three stillbirths were found in litter B. Moreover, the diagnosis of pectus excavatum and swimming dog syndrome was recorded, the latter characterized by lateral displacement of the pelvic limbs (Vijayakumar, Nambi & Prathaban, 2012) in one of the live-born puppies of this litter.

The cleft palate, a congenital disease, was observed in one of the puppies from litter C, which may have a hereditary character (Santos, 2010). The puppy with the secondary cleft lip evolved to death on the second day of life. Despite proposed by Santos (2010), the heredity of the congenital anomaly cannot be proven in this study, as the parent cross of this litter has not yet been repeated. Therefore, this crossing will be avoided, as proposed by Santos (2010). Also on the clinical aspects observed in litter C, two episodes of parasitic enteritis (one male and one female) were observed. Also, litter E had one pup with cleft palate, which died on the fourth day of life. Furthermore, there was no record of veterinary consultations until the 45th day of life of these puppies.

Still regarding the clinical occurrences listed above, a statistically significant difference was observed between litters only for the stillbirth variable. Litter B was disadvantaged in this regard, totaling three stillbirths (Table 1). This litter required a cesarean delivery due to dystocia, unlike the other litters, which had a normal delivery. According to Cavaleiro (2018), most anesthetics have a molecular weight below 300 Da and are relatively fat-soluble. This characteristic associated with the placental contact area relatively large makes most drugs easily cross the transplacental barrier. Propofol was used as an inducing agent and isoflurane was used to maintain the anesthetic plan. Both drugs can cause depressive effects on the respiratory system of fetuses (Traas, 2008), a fact that may have contributed to the increase in stillbirths observed in this litter.

There were low clinical occurrences during the evaluation period, especially when observing the acquired diseases, as the sector has adequate control of the prophylactic schedule, consisting of dewormer and vaccines, in addition to the use of feed, thus following the guidelines highlighted by Beloni (2001) apud Barreto (2003). This assertive supervision leads to a reduction in the incidence of serious illnesses in the puppies or even the worsening of illnesses, which can lead to their death (Souza, 2017).

Regarding the zootechnical data, the number

of puppies born per litter was first recorded and their parentage was retrieved. Six puppies were counted in litter B (progenies from Amely x Marveric), including the three stillborn, eight in litter C (progenies from Eva x Toots), and ten in litter E (progenies from Beiju x Caraja). This number of puppies agrees with what was observed by Beckett (1998), who estimated an average number of puppies ranging from six to ten when it comes to Labrador Retriever dogs.

The average weights of the puppies per litter were calculated on the seventh and fourteenth day of life, while the average daily weight gain was obtained on the eighteenth day of life, as shown in Table 2.

**Table 1.** Casuistry of clinical occurrences in puppies from birth to the 45th day of life, born in the Guide Dog Program of the Federal Institute of Goiás, Campus of Urutaí, presented by litter and compared by Fisher's exact test.

Clinical occurrence	Litter B	Litter C	Litter E	p-value
Stillborn	50.0% (a)	0.0% (b)	0.0% (b)	0.0099
Pectus excavatum and swimming dog syndrome	16.7% (a)	0.0% (a)	0.0% (a)	0.2500
Cleft palate	0.0% (a)	12.5% (a)	10.0% (a)	1.0000
Parasitic enteritis	0.0% (a)	25.0% (a)	0.0% (a)	0.1558

**Table 2.** Average weight (kg) at birth and on the seventh and fourteenth day of life and average daily gain on the eighteenth day of life of litters of dogs born in the Guide Dog Program of the Federal Institute of Goiás, Campus of Urutaí, compared by analysis of variance followed by the Tukey's test.

Variable	Litter B	Litter C	Litter E	p-value
Weight at birth	NE	0.3750 (a)	0.3620 (a)	0.6147
Weight on the 7th day of life	1.011 (a)	0.6510 (b)	0.5970 (b)	<0.0010
Weight on the 14th day of life	1.649 (a)	1.0500 (b)	1.0050 (b)	<0.0010
Average daily weight gain on the 18th day of life	0.1234 (a)	0.0753 (b)	0.0747 (b)	<0.0010

NE = not evaluated

Litter B did not have data on the average weight of puppies at birth, which is due to the absence of the digital scale at the time of delivery. However, a marked statistical difference was found between the average weights of puppies on the 7th ( $p < 0.0010$ ) and 14th day ( $p < 0.0010$ ) and an average daily gain on the 18th day, when comparing litters B against C and E.

Saad (2009) reported that the daily energy requirement of the female dog increases during the lactation period to ensure sufficient energy for milk production and breastfeeding a large number of puppies and supply its basal energy requirement. In this scenario, puppies from the same litter may sometimes have different weights from each other since access to the mammary gland may be hampered by competition.

A higher volume of breast milk was provided for litter B due to less competition between the fewer

live puppies, thus increasing the average daily weight gain, which resulted in the higher weight of puppies in the evaluations (Saad, 2009). Additionally, this finding reinforces the need to maintain the management used at the Guide Dog Training Center to promote assisted breastfeeding of puppies every three hours to ensure that these puppies acquired passive immunity (Lennoz-Roland, 1999) and avoid episodes of hypoglycemia, hypothermia, dehydration, or less severely, inhibit the delay in body development (Hoskins, 1995).

The data related to the behavior were collected, analyzed, and shown in Table 3. The use of the Behavior Checklist for behavioral evaluation of puppies in the Guide Dog Program was implemented after the birth of litter B. Three variables stood out, namely: anxiety in unknown places, hyper-attachment, and fear of strangers. Litter C presented higher values for these variables considering the score 0 - absent; 1 - very slight; 2 -slight; 3 - moderate; and 4 - severe. Thus, litter E presented the best behavioral performance considering the equality between the other studied behavioral variables.

**Table 3.** Scores of behavioral variables obtained in the Volhard and Behavior Checklist tests, evaluated in litters of dogs born in the Guide Dog Program of the Federal Institute of Goiás, Campus of Urutaí, with comparison using the Kruskal-Wallis test

Median	Litter B	Litter C	Litter E	p-value
Volhard test	3	3	3	0.7308
Anxiety in unknown places	NE	1	0	<b>0.0327</b>
Sensitivity to noise/sounds	NE	3	2	0.7862
Fear of a new object	NE	1	0	0.5193
Fear of surfaces	NE	2	0	0.1443
Fear of stairs	NE	3	1,5	0.5474
Separation anxiety	NE	1	0	0.1596
Hyper-attachment	NE	2	0	<b>0.0155</b>
Fear of strangers	NE	0.5	0	<b>0.0227</b>
Sensitivity to harness	NE	0	0	0.2037
Activation of exposure to stressful situations	NE	1	0	0.9547
Slow return to a productive emotional state	NE	2	0	0.8629
Restless when the driver is stopped	NE	2	1	0.9561
Bark persistently	NE	0	0	0.3778
High energy level	NE	0	0	0.5195
Lack of concentration	NE	2	2	0.7857
Habit of searching/poking around	NE	1	2	0.3533
Unwillingness to serve	NE	1	1	1.0000

NE = not evaluated

Litter E, unlike litter C, had its first days of life in a home environment, being exposed to intense and premature desensitization since the animals were under different situations, for instance, external noises such as brake noises, horn, and bell; internal noises such as blender, television, and radio; contact with various objects and surfaces; and constant contact with the residents. These stimuli are essential for effective desensitization. This premature desensitization is emphasized by Overall (2013) as being habituation, which will lead the dog to decrease responses to a given stimulus as a consequence of continuous and prolonged exposure to it. Thus, litter E was stimulated more intensely, also being the last litter, thus showing higher benefit from the mating orientation pressure and consequent higher expected difference index in the progeny for chosen traits. It may have influenced the best score received for certain studied behavioral variables. Regarding the expected difference in progeny, researchers have affirmed that the maintenance of successive crosses with the presence of genetic material from selected animals, with desirable phenotypes, can improve the quality of desirable traits or even inhibit the appearance of undesirable phenotypes (Goddard & Beilharz, 1983).

Discussing the sensitivity of the behavioral tests is important. In this sense, the Volhard test evaluated ten variables (Appendix A), including the behavioral and physical profile of the puppies (Volhard, 2007), but the test conclusion considered the mode obtained between these variables. On the other hand, the Behavior Checklist has individualized evaluations, that is, the behavioral variables are analyzed separately. Thus, this test has a higher sensitivity in detecting undesirable behavioral deviations. Thus, Guide Dog Training Centers have promoted the early selection of the best possible animals for functional training depending on the studied variable, scored scale, and, consequently, identified behavioral deviation (Goddard & Beilharz, 1983).

These results allow for comparative characterization of the clinical, zootechnical, and behavioral panorama of puppies of the Urutaí Guide Dog Program, which may serve as a technical subsidy for the decision-making of the Guide Dog Program managers.

## CONCLUSION

There was a difference between litters regarding the evaluated zootechnical and behavioral aspects. The intense sanitary care maintained the occurrence of acquired diseases low for all litters. Extra care must be taken regarding maternal feeding and breastfeeding of puppies in situations in which litters have a different number of live births than expected for the breed.

Also, the early desensitization promoted premature habituation, contributing to the behavioral development of puppies, especially regarding the characteristics of hyper-attachment, anxiety in unknown places, and fear of strangers. Furthermore, in general, the litter quality evolved, with the last litter presenting the best behavioral profile, as the parents were animals from the kennel.

These results should be used as technical data by the managers of the Guide Dog Training Centers aiming at future herds and, consequently, an increase in the number of puppies per litter suitable for training for the service of guiding people with visual impairments.

## SUPPLEMENTARY FILES

### [Supplementary file A. Behavior checklist](#) (in Portuguese)

This file (.xlsx) is a spreadsheet used for behavioral assessment of puppies aged 6-8 weeks. With this, each variable studied is scored as absent, very mild, discrete, moderate, severe. As a result of the test, the puppies can be ranked in relation to each variable.

### [Supplementary file B. Volhard Test](#) (in Portuguese)

This file (.docx) contains the Volhard test in spreadsheet form. The test is used to classify puppies with 48 days of life in terms of selected behavioral aspects, sensitivity to painful and sound stimuli, and evaluating the posture and structural conformation of the animal. Each analyzed variable was scored from 1 to 6. At the end, the mode was obtained and the animal's profile was read.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

## REFERENCES

- Beckett, D. (1998). *Retrievers-do-Labrador, Guia do - Animais de estimação*. São Paulo: Nobel.
- Beloni, S.N.E. (2001). Neonatologia em cães e gatos. In *Simpósio de Reprodução de Animais de Companhia, Londrina, Paraná* apud BARRETO, C.S. (2003). *Avaliação de filhotes caninos*. (Monografia). Faculdade de Medicina Veterinária e Zootecnia da UNESP-Bocutacu - São Paulo, Brasil.
- Cavaleiro, D.S.X. (2018) *Efeito da anestesia usada durante a cesariana no vigor e mortalidade neonatal*. (Dissertação de Mestrado Integrado em Medicina Veterinária). Universidade do Porto, Portugal.
- Chelini, M.O.M., & Otta, E. (2016) *Terapia assistida por animais*. Barueri, São Paulo: Manole.
- Goddard, M.E., & Beilharz, R.G. (1983). Genetics of traits which determine the suitability of dogs as guide-dogs for the blind. *Applied Animal Ethology*, 9, 299- 315. DOI: [https://doi.org/10.1016/0304-3762\(83\)90010-X](https://doi.org/10.1016/0304-3762(83)90010-X).
- Hoskins, J.D. (1995). *Veterinary pediatrics*. Philadelphia, USA: Saunders.
- Instituto Brasileiro de Geografia e Estatística (2010). *Censo Brasileiro de 2010. Características gerais da população, religião e pessoas com deficiência. População residente por tipo de deficiência permanente, 2010*. Disponível em: <<https://www.ibge.gov.br/estatisticas-novportal/sociais/saude/9662-censo-demografico-2010.html?edicao=9749&t=destaques>>. Accessed 07/05/2020.
- Júnior, A. C., & Oliveira, L. A. G. (2016). As principais causas de cegueira e baixa visão em escola para deficientes visuais. *Revista Brasileira de Oftalmologia*, 75(1), 26-29. DOI <https://doi.org/10.5935/0034-7280.20160006>.
- Lennoz-Roland. M. (1999). Mortalidade de cães recém-nascidos: influência da gestação, parto e aleitamento. *A Hora Veterinária*. 18(107), 45-51.
- Nunes L. G. (2019) Treinamento de cães-guia: um estudo de caso. In Souza, M. S. et al. *CÃES-GUIA NO BRASIL: primeiros estudos* (pp. 62-75). Rio de Janeiro: Letra Capital Editora.
- Overall, K.L. (2013). *Manual of Clinical Behavioral Medicine for Dogs and Cats*. St. Louis, Missouri: Elsevier Mosby.
- Saad, F.M.O.B. (2009). Aspectos nutricionais de cães e gatos em várias fases fisiológicas - Animais em Crescimento X Manutenção X Gestante X Idoso. *I Curso de Nutrição de Cães e Gatos FMVZ-USP, São Paulo*, 1-3 maio 2009. DOI: 10.13140/2.1.2767.6487.
- Santos, J.S.N., Oliveira, A.S., Cavalcanti, J.M.W.M.U., Barbosa, P.E., Freitas, M.L.B., Araújo, I.R.M., Lira, C.C.S., Barros, M.B.S., Tenório, A.P.M., Pereira, M.F. (2010). Fenda palatina em cão neonato: achados de necropsia. In *X Jornada de Ensino, Pesquisa e Extensão*, UFRPE. Anais. Recife.
- Souza, T. D., Mol, J. P. S., Paixão, T. A., Santos, R. L. (2017) Mortalidade fetal e neonatal canina: etiologia e diagnóstico. *Bras. Reprod. Anim.*, 40(2), 639-649. Disponível em: <[https://www.researchgate.net/profile/Tayse\\_Souza/publication/321010189\\_Mortalidade\\_fetal\\_e\\_neonatal\\_canina\\_etiologia\\_e\\_diagnostico/links/5a07023ca6fdcc65eab3a151/Mortalidade-fetal-e-neonatal-canina-etiological-e-diagnostico.pdf](https://www.researchgate.net/profile/Tayse_Souza/publication/321010189_Mortalidade_fetal_e_neonatal_canina_etiologia_e_diagnostico/links/5a07023ca6fdcc65eab3a151/Mortalidade-fetal-e-neonatal-canina-etiological-e-diagnostico.pdf)>. Accessed 18/05/2020.
- Traas, A.M. (2008). Surgical management of canine and feline dystocia. *Theriogenology*, 70(3), 337-42. DOI: 10.1016/j.theriogenology.2008.04.014.
- Vijayakumar G., Nambi, A.P. & Prathaban, S. (2012) Clinical Management of Swimmer Puppy Syndrome in a Dog. *IntasPolivet*, 13 (2), 321-323.
- Volhard, J. & Vollhard, W. (2007). Choosing Your Puppy (PAT). Disponível em: <<https://www.volhard.com>>. Accessed 19/05/2020.

To cite this paper:

Silva, L.B.A., Naves, B.M., Oliveira, K.S., Carvalho, R.O.A., Carmo, A.S. do, & Ávila Filho, S.H. (2021). Clinical, zootechnical and behavioral evaluation of litters of dogs born in the guide dog program of the 'Instituto Federal Goiano', Campus Urutaí, Brazil. *Multi-Science Journal*, 4(1): 57-61. DOI: <https://doi.org/10.33837/msj.v4i1.1512>