

Literatura citada

Allen, M.S. 1996. Physical constraints on voluntary intake of forages by ruminants. Journal of Animal Science. 74:3,063-3,075.

Allen, M.S. 1997. Relationship between fermentation acid production in the rumen and the requirement for physically effective fiber. Journal of Dairy Science. 80:1,447-1,462.

Bailey, C.B. 1961. Saliva secretion and its relation to feeding in cattle. III. The rate of secretion of mixed saliva in the cow during eating, with an estimate of the magnitude of the total daily secretion of mixed saliva. British Journal of Nutrition. 15:443-451.

Beharka, A.A., Nagaraja, T.G., Morrill, J.L., Kennedy, G.A., and Klemm, R.D.. 1998. Effects of form of diet on anatomical, microbial, and fermentative development of the rumen of neonatal calves. Journal of Dairy Science. 81:1,946-1,955.

Bizerril, M.X.A, Rodrigues, F.H.G., Hass, A.2005. Fruit consumption and seed dispersal of *Dimorphandra mollis Benth.* (*Leguminosae*) by the lowland tapir in the Cerrado of Central Brazil. Brazilian Journal of Biology. 65(3):407-413.

Clauss M., and Dierenfeld E. 2008. The nutrition of “browsers”. In Fowler, M.E., Miller, R.E., Zoo and Wild Animal Medicine Current Therapy 6, Saunders. USA, p. 444- 454.

Clauss, M., Kienzle, E., Hatt, J.M. 2003a. Feeding practice in captive wild ruminants: peculiarities in the nutrition of browser/concentrate selectors and intermediate feeders. A review. In Fidgett, A., Clauss, M., Ganslosser, U., Hatt, J.M., Nijboer, J. Zoo Animal Nutrition. Vol II. p.27 – 52.

Clauss, M., Kienzle, E., Wiesnet, H. 2003b. Feeding browser to large zoo herbivores: how much is “a lot”, how much is “sufficient”? In Fidgett, A., Clauss, M., Ganslosser,U., Hatt, J.M., Nijboer, J. Zoo Animal Nutrition. Vol II. p.17 – 25.

Cruz, E.2001. Hábitos alimentarios e impacto de la actividad humana sobre el tapir en la Reserva de la Biosfera La Sepultura, Chiapas, México. Tesis de Maestría. El Colegio de la Frontera SUR, San Cristóbal de las Casas, Chiapas, México. p.35.

Downer, C.C. 2001. Observations on the diet and habitat of the mountain tapir (*Tapirus pinchaque*). Journal of Zoology. 254:279-291.

Eisenberg, J.F.1989. Mammals of the Neotropics. The Northern Tropics. Panama, Colombia, Venezuela, Guyanas, Surinam. Vol.II. First Edition. The University of Chicago Press. Pp. 395-397.

Furstenburg D. and Van Hoven, W. 1994. Condensed tannin as an anti-defoliate agent against browsing by giraffe (*Giraffa camelopardalis*) in the Kruger National Park. Compendium Biochemical Physiology. 107A(2):425-431.

García, M.J.V. 2006. Caracterización de la dieta y el hábitat del tapir (*Tapirus bairdii* Gill, 1865) en ecosistemas ribereños del Parque Nacional Laguna Lachuá, Cobán, Alta Verapaz, Guatemala. Tesis de licenciatura. Facultad de Ciencias Químicas y Farmacia. Universidad de San Carlos. Guatemala. 105 p.

Henry, O., Feer, F., Sabatier, D. 2000. Diet of the lowland tapir (*Tapirus terrestris* L.) in French Guiana. Biotropica. 32(2): 364-368

Hoffman, R.R., and Matern, B. 1988. Changes in gastrointestinal morphology related to nutrition in giraffes (*Giraffa camelopardalis*): a comparison of wild and zoo specimens. International Zoo Yearbook. 27:168-176.

Irbeck, N., Moore, M., Dierenfeld, E. 2006. Evolution of a browse database – a global application. In Fidgett, A., Clauss, M., Eulengerger, K., et al. Zoo Animal Nutrition Vol III. P. 199 – 200.

Jansen, W.L., and Nijboer, J. 2003. Zoo animal nutrition tables and guidelines. European Zoo Nutrition Centre. Amsterdam. p.60

Janssen, D., Rideout, B., Edwards, M.1996. Medical Management of captive tapirs, Proceedings of the American Association of Zoo Veterinarians Annual Conference, Puerto Vallarta, México.

Janssen, D. 2003. Tapiridae. In Fowler, M.E., Miller, R.E. Zoo and Wild Animal Medicine Fifth Edition, Saunders. USA, p. 569- 577

Janzen, D.H. 1982. Seed in tapir dung in Santa Rosa National Park, Costa Rica. Brenesia.19(20):129-135.

Lira, I.T, Naranjo, P.E.-J, Güiris, A. D.M., Cruz, A.E. 2004. Ecología de *Tapirus Bairdii* (Perissodactyla: Tapiridae) en la reserva de la Biósfera el triunfo (Polígono I), Chiapas, México. Acta Zoológica Mexicana.20(1):1-21.

Lizcano, D.J. y Cavelier, J. 2004. Características químicas de salados y hábitos alimenticios de la danta de montaña (*Tapirus pinchaque Roulin, 1829*) en los Andes Centrales de Colombia. Mastozoología Neotropical. 11(2):193-201.

Maekawa, M., Beauchemin, K.A., Christensen, D.A. 2002. Effect of concentrate level and feeding management on chewing activities, saliva production, and ruminal pH of lactating dairy cows. Journal of Dairy Science. 85:2,574-2,579.

March, I.J. 1994. Situación actual del Tapir en México. CIES. Centro de Investigaciones Ecológicas del Sureste, serie Monográfica N°1, San Cristóbal de las Casas, Chiapas, México.41pp.

Mertens D.R. 1997. Creating a system for meeting the fiber requirements for dairy cows. Journal of Dairy Science. 80:1,463-1,481.

Murphy, M.R., Masters, J.M., Moore, D.M., Glass, H.D., Hughes, R.E., Crissey, S.D. 1997. Tapir (Tapirus) enteroliths. Zoo Biology. 16: 427-433.

Naranjo, E.J. 1995. Hábitos de alimentación del Tapir *Tapirus bairdii* en un bosque lluvioso tropical de Costa Rica. Vida Silvestre Neotropical 4:32-37

Naranjo, E.J. y Cruz, E. 1998. Ecología del Tapir *Tapirus bairdii* en la Reserva de la Biósfera La Sepultura Chiapas, México. Acta Zoológica Mexicana.73:111-123.

Nidasio, D.C.G. 2008. Composición nutricional de la dieta de tapir (*Tapirus bairdii*) cautivo utilizando tres árboles forrajeros como complemento a su alimentación. Memorias del Curso: Utilización de forrajes para herbívoros silvestres. División de Educación Continua. Facultad de Medicina Veterinaria y Zootecnia. Universidad Nacional Autónoma de México

NRC (National Research Council) 1989. Nutrient Requirements of Horses. Fifth Revised Edition. Washington, DC:

National Academy Press.100 pp.

Owens, F.N., Secrist, D.S., Hill W.J., Gill, D.R. 1998. Acidosis in cattle: a review. Journal of Animal Science. 76:275-286.

Robbins, C.T. 1993. Wildlife Feeding and Nutrition. 2a. ed. San Diego, CA. Academic Press, Inc. 352 pp.

Salas, L.A. y Fuller, T.K. 1996. Diet of the lowland tapir (*Tapirus terrestris* L.) in the Tabaro River valley southern Venezuela. Canadian Journal of Zoology-Revue Canadienne De Zoologie. 74(8):1,444-1,451.

Shoemaker, A.H., Barongi, R., Flanagan, J., Janssen, D., Hernández-Divers, S. 1999. Husbandry Guidelines for Keeping Tapirs Captivity. [Cited 5 enero 2009.] Available from URL: HYPERLINK http://www.tapirs.org/committes/zoo-committe.html

Stevens, C.E. 2001. The Digestive System of Vertebrates. Electronic books (CD). North Carolina State University. College of Veterinary Medicine. Biomedical communications.

Terwilleger, V.J. 1978. Natural History of Bairds Tapir on Barro Colorado Island, Panama Canal Zone. Biotropica. Vol.10. 211-220 pp.

Tobler, M.W. 2002. Habitat use and diet of Baird’s tapirs (*Tapirus bairdii*) in a montane cloud forest of the

New sightings of the mountain tapir in the Central Andes of Ecuador by camera trapping

Andrés Tapia, Juan Pablo Reyes, Luis Sandoval, Lina Santacruz, Nelson Palacios, Hugo Mogollón, Verónica Quitigüiña, Diana Bermúdez

Grupo de Especialistas en Tapires – Ecuador
Proyecto de Conservación del Tapir Andino en los Andes Centrales del Ecuador (PCTA)
Av. Luis A. Martínez, Baños, Tungurahua-Ecuador. Phone: +593 03 2741039
pcta@findingspecies.org

Background

Since 2007, the Project of Conservation of the Mountain Tapir (*Tapirus pinchaque*) (PCTA), has been carrying out actions focused on conservation of remaining populations of the species in the eastern slopes of the Ecuadorian`s central Andes, through three main topics: i) research and field monitoring, ii) capacity building, local training, environmental education and communication iii) and conservation through non government protected areas (Tapia *et al., 2008*).

Regarding the first item, we are conducting research on activity patterns of the mountain tapir in the eastern slopes of Tungurahua volcano, in order to evaluate social behavior and activity patterns of the species in the study area by using camera trapping techniques. Here, we report new sightings of *T. pinchaque* in this area, which increase records of the species in the

Cordillera de Talamanca, Costa Rica. Biotropica. 34(3):468-474.

Van Soest, J. P., Robertson, J.B., Lewis, B.A. 1991. Methods for dietary fiber, neutral detergent fiber and nonstarch polysaccharides in relation to animal nutrition. Journal of Dairy Science. 74:3,583-3,597.

Vavra, M. and Holechek J.L. 1980. Factors Influencing Microhistological Analysis of Herbivore Diets. Journal Of Range Management 33(5):371-374.

Williams, K.D. 1984. The Central American Tapir (*Tapirus bairdii* Gill) in northwestern Costa Rica. Tesis doctoral, Michigan State University, East Lansing, MI, USA.83 pp.

central Andes, previous to those reported in the past (Reyes-Puig *et al.*, 2007, 2008) including historic/ anecdotal records reported elsewhere by local people. The abundance of direct sightings and indirect evidence of tapir occurrence enforce the potentiality of this zone to maintain viable populations of *T. pinchaque* in the central Andes.

Recent records by camera traps

Historically, anecdotal reports by local villagers and naturalists persisted in the literature (Martínez, 1933) in this part of the Ecuadorian central Andes. These records, as well as scientific reports of tapir populations in the central Andes (Sangay and Llanganates National Parks) (Downer, 1996-2001), noted the importance of this zone for mountain tapir conservation in its whole distribution range. Nevertheless, geographic

distribution maps designed by Downer (1997) for this region reveal numerous gaps and are not up-to-date at the present. Thus, new confirmed records by direct sightings and visual information are of importance in order to update the distribution range of the species and aggregate information to the literature.

As part of an undergraduate thesis on activity patterns of *T. pinchaque*, we registered the first sightings of mountain tapirs in the central Andes of Ecuador with application of camera trapping methods. During field trips in the end of 2010 and the first part of 2011, several new records of mountain tapirs have been recorded in the eastern Tungurahua volcano, San Antonio de Puntzán communitarian reserve, mainly at the salt lick called la cascada de las Dantas (Fig. 1).

The first pictures were registered on December 2010 on a tapir track in cloud forest; many other species (i. e. terrestrial birds and mammals) were also

documented in this site. Also, camera traps located at sampling sites near to river borders and salt licks of the Río de la Sal sector, recorded a pair of tapirs, as shown on figures 1-3.

Recently, new sightings were recorded at 4 camera trap stations in the humid cloud forests of the study area. This includes a first record of a female with her calf by camera trapping in Ecuador and suggests that the calf may have been born few months ago. Other species sharing habitat with tapirs in the zone, were also photo-trapped, including bears (2b) and pumas (Figure 3b). Some pictures were trapped during the day and night suggesting that the mountain tapir could be a bimodal activity pattern, therefore this hypothesis will be determinate in the future.

The reporting of these new records is preliminary and this research is still ongoing, but new direct sightings of mountain tapirs in Ecuador are increasing



Figure 2. Sightings of mountain tapirs by camera trapping in central Andes of Ecuador. 2a) tapir and 2b) bear on cloud forest, 1c) river borders and 1d) salt licks records. Pictures: PCTA (2011).

References

Martínez, N.G. 1933. Exploraciones en los Andes Ecuatorianos. El Tungurahua. Publicaciones del observatorio de Quito. Sección de Geofísica. Imprenta Nacional. Quito-Ecuador. Pp. 88.

Reyes-Puig, J.P., Palacios, N. & Tapia, A. 2007. Tungurahua Volcano: An Strategic Refuge for Mountain Tapirs in Ecuador. Tapir Cons 16: 16-17.

Reyes-Puig, J.P., Sandoval-Cañas, L., Palacios, N., Palacios, S. & Tapia, A. 2008. Tras los pasos de la danta en las montañas del alto Pastaza. GAIA 1: 30-39.

Tapia, A., Reyes-Puig, J.P., Sandoval-Cañas, L Palacios, N. & Bermúdez, D. 2008. Proyecto de conservación del tapir andino (*Tapirus pinchaque*) en la vertiente oriental de los Andes centrales del Ecuador. Parque Nacional Sangay 1: 63-66.

Downer, C. 1996. The mountain tapir, endangered “flagship” species of the high Andes. Oryx 30: 45-58.

Downer, C. 1997. Status and action plan of the mountain Tapir (*Tapirus pinchaque*) en D. M. Brooks, R. E. Bodmer and S. Matola (Eds.). Tapirs, status survey and conservation action plan, pp. 10-22. IUCN/SSC Tapir Specialist Group, IUCN, Gland, Switzerland and Cambridge, England.

Downer, C. 2001. Observations on the diet and habitat of the mountain tapir (*Tapirus pinchaque*). J. Zool., Lond. 254: 279-291.

Tapir Specialist Group. 2011. Estrategia Nacional para la Conservación de los Tapires en el Ecuador. Grupo Especialistas en Tapires. Primera Edición. Quito, Ecuador.

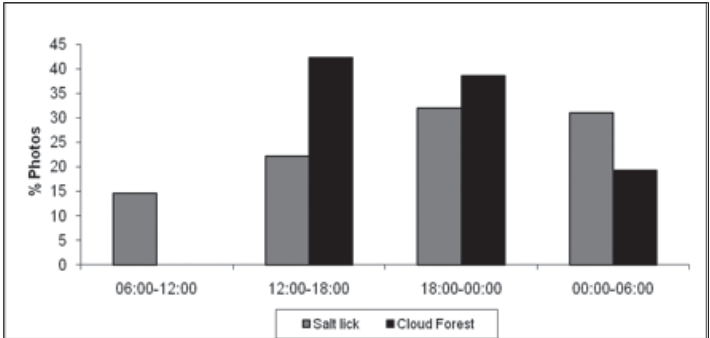


Figure 1. Preliminary results about activity patterns of mountain tapir, photo's percentage and period of time at the Salt lick “Cascada de las Dantas” and cloud forest.

knowledge about social behavior (activity patterns) of remaining tapir populations in the region and filling out geographic gaps in order to update mountain tapir geographic occurrence in its whole distribution range. Furthermore, field research like the present one, constitutes an application of the objectives, priority actions and goals of the National Strategy for Tapir Conservation in Ecuador (TSG, 2011), related to its second strategic principle, named In-situ conservation.

Acknowledgements

This research is supported by Tapir Conservation Funds of the Tapir Specialist Group. We thank local people of San Antonio de Puntzán communitarian reserve for their active participation during the study and the Enviromental Ministry of Ecuador for providing the research certifications for our work.



Figure 3. 3a) First record of tapir calf with camera traps in the central Andes of Ecuador at cloud forest. 3b) Puma in cloud forest. Pictures: PCTA (2011).