



RELATION OF DAIRY GOAT CHRONIC DISEASES AND HAIR CORTISOL IN AN INTENSIVE GRAZING PRODUCTION SYSTEM

J.I. Ortega Cortés*, Y.M. Domínguez Hernández*, A.M. Terrazas García†, L. Cobos Marín‡, J.G. Perera Marín§ and I.E. Candanosa Aranda*



*Faculty of Veterinary Medicine and Zootechnics, Center for Teaching, Research and Extension in Animal Production in Highlands, National Autonomous University of Mexico, Tequisquiapan, Querétaro, MX, †Faculty of Superior Studies Cuautitlán, Department of Livestock Sciences., National Autonomous University of Mexico, Cuautitlán, Estado de México, MX and ‡Faculty of Veterinary Medicine and Zootechnics, Department of Microbiology and Immunology and §Faculty of Veterinary Medicine and Zootechnics, Department of Reproduction, National Autonomous University of Mexico, Mexico City, MX

INTRODUCTION

There is evidence of the relation between animal welfare and the presence of chronic diseases (1, 2). Most of dairy goat herds, deal with at least one chronic disease such as caprine arthritis encephalitis (CAE), paratuberculosis (PTB), toxoplasmosis, caseous lymphadenitis, among others (3). Hair cortisol concentration has been proved as a reliable chronic stress indicator in goats (4).

MATERIALS AND METHODS

A group of 70 grazing dairy goats were oestrus-synchronized, 43 pregnant were selected. Blood samples were taken for leptospirosis diagnosis by Microscopic Agglutination Test (MAT), while CAE, PTB and brucellosis via Luminex multiplex. Hair samples were taken (3 d before mating, 7 d postpartum, 60 and 150 d of lactation) for cortisol determination via ELISA assay. SAS® software for statistical analysis with Proc Univariate, Shapiro Wilk, ANOVA with repeated measurements and Tukey tests. Significance level $P < 0.05$.

REFERENCES

1. Broom, D. (2006) Behaviour and welfare in relation to pathology. Applied Animal Behaviour Science. 1;97(1):73-83.
2. Cockram, M. and Hughes, B.(2018). Health and disease. Animal welfare, (Ed. 3), 141-159.
3. Palomares, G. et al. (2021). Important infectious diseases in goat production in Mexico: history, challenges and outlook. Revista mexicana de ciencias pecuarias, 12, 205-223.
4. Endo, N., et al, (2018). Effect of repeated adrenocorticotrophic hormone administration on reproductive function and hair cortisol concentration during the estrous cycle in goats. General and comparative endocrinology, 259, 207-212.
5. Gaytán-Camarillo, et al. (2021). Spatial autocorrelation and co-occurrence of six serovarieties of Leptospira in goat herds of the State of Guanajuato, Mexico. Brazilian Journal of Microbiology, 52(2), 953-960.
6. De la Luz-Armendáriz, et al.(2021). Prevalence, molecular detection, and pathological characterization of small ruminant lentiviruses in goats from Mexico. Small Ruminant Research, 202, 106474.
7. Vega-Manriquez, D., et al. (2020). Serological detection of paratuberculosis in family productions of cattle and goats of the Potosi highlands, Mexico. Ecosystems and agricultural resources, 7(2).
8. Mphahlele, N. et al. (2004). Body temperature, behavior, and plasma cortisol changes induced by chronic infusion of Staphylococcus aureus in goats. American Journal of Physiology-Regulatory, Integrative and Comparative Physiology, 287(4), R863-R869.
9. Singh, S., et al. (2018). Lipopolysaccharide exposure modifies salivary and circulating level of cortisol in goats. Small Ruminant Research, 162, 30-33.

RESULTS AND DISCUSION

FIG 1
Frequency, prevalence and number of diseases diagnosed in dairy goats.

Number of diseases	Diseases	Frequency	Prevalence
0	--	6	14
1	CAE	8	18.5
	Lepto	6	14
	Total	14	32.5
2	CAE+Lepto	10	23.5
	CAE+PTB	8	18.5
	Total	18	42
3	CAE+Lepto+Par	3	7
	AEC+PTB+Par	1	2.25
	AEC+Lepto+PTB	1	2.25
	Total	5	11.5

-CAE= Caprine Arthritis Encephalitis. -Lepto= leptospirosis. -PTB= paratuberculosis. -Par= parasites. n=43

Previous studies of leptospirosis in the Mexican highlands report prevalence of 37.9%, the prevalence observed in the present study is higher than previously reported (41.43%)(5). CAE prevalence of 11% was reported for serological studies conducted in Mexican goats, contrasting with prevalence observed in the present study (72.09%)(6). PTB prevalences are similar to the ones reported for the region and productive system (46.5%)(7) (Fig 1). Previous studies showed the relation of the administration of *S. aureus* with febrile response, disease behavior and cortisol concentrations (8). A recent study identified that the administration of LPS is related to the increase in cortisol concentrations in saliva and plasma of goats (9) (Fig 2).

Fig. 2. Comparison of means of dairy goats hair cortisol in different productive stages.

Variable	Mating	Postpartum	60d	150d	P
Hair cortisol (pg/ml)	11.02 ± 0.84 a	10.49 ± 0.32 a	12.86 ± 0.88 ab	14.71 ± 0.95 b	0.008

-Data shown as mean ± MSE. -a, b: means with different letter on the same row show statistical differences between productive stages ($P \leq 0.05$).

CONCLUSIONS

Association between number of diseases and higher cortisol concentrations was demonstrated. In other words, goats showed more chronic stress if more diseases were positive. It is necessary to study other stimuli that raise cortisol concentrations, such as pain.

ACKNOWLEDGEMENTS

To CONACYT for the financial support. To the National Autonomous University of Mexico for financial support through PAPIIT-IN220420 project. Dr. Mayra Sierra support for statistical analysis.