

## Shortening the period of exposure of young does to sexually active bucks and consequences on puberty

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## Introduction

In small ruminants, sociosexual cues play a major role in the control of reproduction (1). In goats, the introduction of an intact buck becoming sexually active induces an earlier puberty onset of spring-born does (2). However, this effect was observed by exposing the females from weaning (during June), several months before the males entered the breeding season (during September). As exposed females became pubescent in September, this study aims to show whether a shortened exposure of females to males just before their entry into the breeding season (mid-August) can also trigger this phenomenon of puberty acceleration. The second objective of this study is to assess whether exposure to the sexually active buck triggers an early maturation of the neuroendocrine network, in particular kisspeptin neurons known to have a key role in the puberty onset in mammals.

 Experimental design

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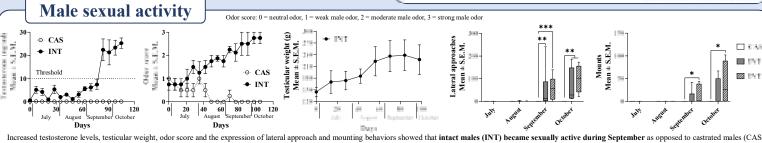
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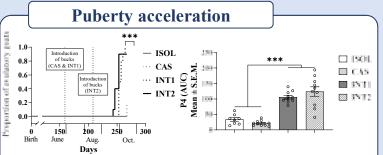
 10 does exposed to ansate backs sace the end of face (INTH prop)

 10 does expose (INTH prop)

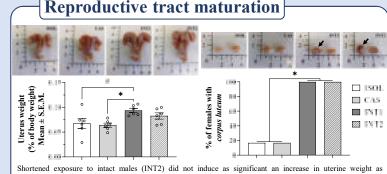
inetrieval of brain, uterns and ovarie



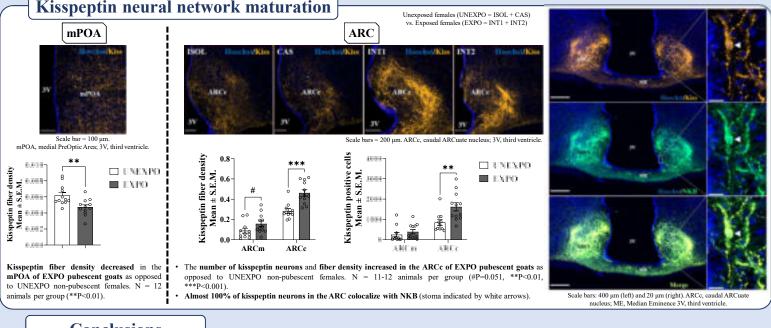
Increased testosterone levels, testicular weight, odor score and the expression of lateral approach and mounting behaviors showed that **intact males (INT) became sexually active during September** as opposed to castrated males (CAS) that remained sexually inactive. N = 4 animals per group (\*P<0.05, \*\*P<0.001).



Exposure to intact males resulted in early onset of ovulation and progesterone cyclicity (P4) in females regardless of the timing of buck introduction (late June: INT1, mid-August: INT2) in contrast to females isolated (ISOL) or exposed to sexually inactive castrated males (CAS). N = 8-10 animals per group (\*\*P < 0.001).



Shortened exposure to intact males (IN12) did not induce as significant an increase in uterme weight as prolonged exposure (INT1) compared to females isolated (ISOL) or exposed to castrated males (CAS). **100% of the females exposed to intact males (INT1 and INT2) exposed at least one** *corpus luteum* (black arrows). N = 6 animals per group (#P=0.053, #P<0.05).



## Conclusions

Our results confirm the efficiency of sexually active buck in inducing goat puberty acceleration as described previously (2). Shortening the exposure time to males also caused this phenomenon. Thus, the months of exposure while bucks are inactive seem unnecessary to trigger female puberty onset. This study also demonstrates that exposure of females from the prepubertal period to sexually active males induces neuroendocrine changes, particularly in the kisspeptin neural network of the ARCc. Since kisspeptin has a key role in the pubertal transition, these changes may be responsible for the early initiation of ovulatory activity in females. Since the majority of kisspeptin neurons colocalize NKB (Neurokinin B), our results support the hypothesis that the the development of the KNDy neural network could be a major neuroendocrine change leading to GnRH secretion and therefore an earlier pubertal transition induced by the buck. Further investigations are needed to determine the sensory modalities underlying this early hypothalamic maturation.

nees: (1) Delgadillo, J. A., Hemández, H., Abecia, J. A., Keller, M., & Chemineau, P. (2020). Is it time to reconsider the relative weight of sociosecual relationships compared with photoperiod in the control of reproduction of small ruminant females?. Domestic animal endocrinology, 73, 106468. (2) Chasles, M., Chemeau, D., Moussu, C., Poissenot, K., Beltramo, M., Delgadillo, J. A., Chemineau, P., & Keller, M. (2018). Sexually active bucks are a critical social cue that activates the gonadotrope axis and early puberty onset in does. Hormones and behavior, 106, 81–92.