Female ticks have market on gluttony

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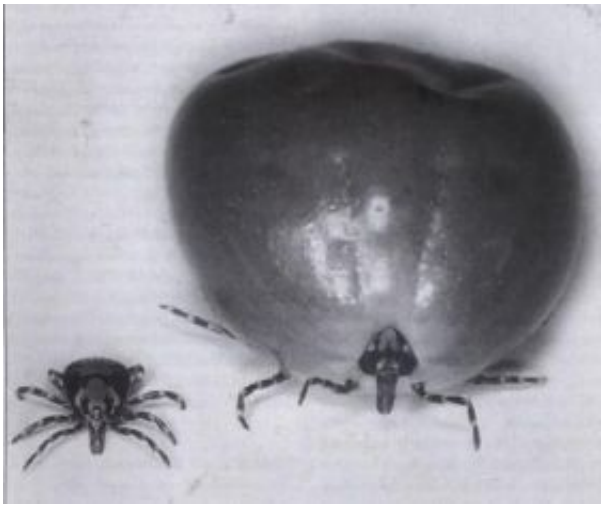

Unfed and engorged tick. Credit: Professor Frans Jongejan, University of Utrecht, Netherlands, and University of Pretoria, Republic of South Africa.

Sex makes you fat. If you're a female tick, that is. The "truly gluttonous" female ixodid tick increases her weight an astounding 100 times her original size after she mates, so a University of Alberta researcher investigated what it is about copulation that triggers such a massive weight gain.

In a new research paper published in the *Journal of Insect Physiology*, Dr. Reuben Kaufman, from the Department of Biological Sciences, suggests several differences between the ixodid tick and her blood-sucking counterparts that help explain the weight gain. Using mosquitoes, tsetse flies, bed bugs and kissing bugs as comparison,

Kaufman found that no one compared to this female African tick when it came to weight gain following mating.

Kaufman suggests that the ixodid tick displays a significant difference in lifestyle from the other insects and that it is adaptive for the virgin to remain small before mating.

First, this species of tick remain on the host for a number of days, rather than minutes. "In this family of ticks, mating takes place on the host," says Kaufman. "Most other insects mate before or after their brief blood meal —the two acts are totally separate, but not with these ticks."

Female ticks require six to 10 days to engorge fully. First, she attaches herself to the skin. Then she feeds to 10 times her unfed weight and finally, after copulation she increases her weight a further tenfold.

On the other hand, the virgin tick rarely exceeds the critical weight necessary for laying eggs. It will hang on to the host for weeks, waiting for a male to find her, says Kaufman. If the virgin gains too much weight and is groomed off the host, it won't reattach itself to another host and continue feeding. "However, if she remains small she still has a chance to reattach itself to another host—hopefully infested with some feeding males-- continuing feeding and potentially mate," says Kaufman. "If a male eventually copulates with her, she will engorge normally and then be able to lay eggs. This is one reason why it might be adaptive for the virgin to remain small until mated."

In terms of what causes the female to become so engorged, Kaufman says that when a tick does copulate, the male's seminal fluid contains two engorgement factor proteins that together act as a signal to tell her to complete engorgement.

Kaufman's future research will look toward the potential to produce an

anti-tick vaccine. Some experiments have already suggested that normal, mated ticks are unable to fully engorge when feeding on a host that has been immunized against the engorgement factor proteins. If these observations can be confirmed and extended, an effective anti-tick vaccine to protect livestock and pets could be on the horizon.

Source: University of Alberta