

Authors' Response

See Original Article *here*
See Comment *here*

Editor,

We read with great interest the commentary on our paper "Death by Ram Attack: A Case Report from Greece and a Brief Review of the Literature" by our colleagues from Germany. This is a response to their insightful comments.

First, our case took place two months after the summer solstice, on the late summer (August 28), thus it is possible that our perpetrator ram was in fact influenced by the increased production of sexual hormones (1).

Nevertheless, animal aggressive behavior can occur in many instances and is not exclusively related to increased androgen secretion. Although it has been reported that there is a well-defined season of sexual activity in rams (including testicular growth, androgen production, and increase in aggressive behavior due to decrease of daylight time), these results mostly concern fights between adult males in an effort to establish priority to mating partners (2).

Besides testosterone-related aggression, many other factors have been proposed as possible causes of aggression such as competition over food, meetings between unacquainted animals, spatial factors, overcrowding, frustration, fear, and pain (1). Unfortunately, animal-specific studies (especially for rams, sheep, and goats) do not exist for most of these factors.

Furthermore, all these factors have been so far, mostly, associated with aggressive behavior between animals, and not with animal-human interactions. Regarding aggression between animals, Fraser and Rushen stated that "Much of the fighting seen among the farm animals takes place under well-defined circumstances, as described previously. This suggests that much of the behavior is reactive rather than spontaneous. Even so, the issue of spontaneous aggressive motivation is important for animal management and has not been well studied" (2).

As we have described in our case report, unfortunately, there were no eyewitnesses present during the incident; thus, the information came from the victim itself, who called over the telephone a friend before losing consciousness. The information provided, lacked details, and as the victim never regained consciousness, the exact circumstances remain unclear. Did the victim do something that "provoked" the ram? Was it a "rush" from the ram? Did the ram horn the ground and nearby vegetation or did it rear on its hindlegs before the collision?

To the best of our knowledge, studies about factors that are associated with aggressive behavior of rams against humans are

extremely scarce. Gougoulis *et al.* described some aggressive behaviors of sheep and rams, such as butting "another ewe from the feed barrier or a resting place," and in general in "changes in space allowance, and especially wall space in the resting area," as a response to invasion in the rams' personal field (3). Hemsworth *et al.* had described that several interactions between humans and sheep (lambs and ewes) at the environment of an abattoir, before slaughter, may be related to elevated cortisol concentrations, which can indicate a stressful situation for the animals. More specifically, "increased head-down in the presence of humans, increased dog use, and reduced whistles, and reduced touches, and pushes by stock-people were associated with increased cortisol concentrations in sheep post-slaughter" (4).

Taking into consideration all the above-mentioned studies, it is more probable that the perpetrator ram attacked the victim, in defense, possibly on the grounds of fear, as a result of victim's invasion in its own space, rather than in "attack." Moreover, the butting could possibly be characterized as accidental. As we have mentioned before, the exact circumstances are still unclear, as no scene investigation was performed, because the victim passed away 21 days after the incident. Nevertheless, the fact that the victim did not bear any open wounds (by the ram's horns), may be suggestive either of the "defensive-action" scenario or of the "accidental" butting.

References

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