

Trophy Hunting and Artificial Selection for Small Horns in Mountain Ungulates



Many mountain ungulates are much sought-after hunting trophies, and the IUCN Caprinae Specialist Group has long supported the inclusion of hunting in conservation programs.

About 20 years ago, we produced a statement that was later used as a basis for the IUCN Guiding Principles on Trophy Hunting. We recognize that sustainable hunting, in accordance to biological principles and including respect for local communities, can have many positive contributions to the conservation of mountain ungulates and their habitat.



10-yr-old ram at Ram Mountain, 2017. He was legal under the 4/5 definition, had been legal since the age of 7. He was still on the mountain during the summer 2018 at the age of 11. Photo Credit: Marco Festa-Bianchet

Members of our group have also produced evidence that in some cases, excessive selective harvest of males with rapidly-growing horns can favor the evolution of smaller horns. The initial paper showing a genetic change in heavily hunted bighorn sheep on Ram Mountain, Alberta, Canada (Coltman et al. 2003) was confirmed by a reanalysis (Pigeon et al. 2016) that accounted for some valid statistical criticisms, and showed that the evolutionary trend towards smaller horns stopped when the trophy hunt was suspended.

Long-term, broad-scale analyses of harvest record suggest that evolutionary change is to be expected when harvests are intense (Garel et al. 2007, Hengeveld & Festa-Bianchet 2011, Pérez et al. 2011, Festa-Bianchet et al. 2014) but can be avoided when regulations limit the selective impact (Büntgen et al. 2018) or when harvest is limited by access (Douhard et al. 2016).

This is not an unexpected result: about 30-40% of variability in sheep horn size is inheritable. Intense artificial selective pressure will cause evolution, especially when, as is the case for wild sheep, ram horns grow to 'trophy' size a few years before large horns confer high mating success (Martin et al. 2016). In that case, a ram risks getting shot before the large horns give him a high mating success.



Ram Trio 2017 - From left to right, rams are aged 6, 4 and 6 years. Photo Credit: Marco Festa-Bianchet

Evolutionary changes can be avoided by regulations that ensure that some large-horned males survive to reproduce. The effectiveness of those regulations can be gauged by analysis of long-term data on the age and horn size of harvested males. For example, when bighorn sheep ram horn size was declining in Alberta in the 1980's and early 1990's, up to a quarter of the harvest was made up of rams aged 4 or 5 years (Festa-Bianchet et al. 2014). In contrast, in parts of British Columbia where the horn size of Stone's ram has not declined, about 70% of the harvest is made up of rams aged 8 years and older (Douhard et al. 2016). Rams with large horns that are harvested at 9 years of age and older have likely already produced some descendants and passed on genes for large horns. Of course, that means that information on the age of harvested rams is extremely important for management.



This 6-yr-old ram is not legal. Photo Credit: Marco

Festa-Bianchet

Many other factors affect the probability that trophy hunting will have an evolutionary impact, including the age-specific role of horn size on mating success, the degree of mate monopolization by large-horned males, the availability of effective sources of non-selected immigrants and gregariousness (Festa-Bianchet 2017). The overriding factors, however, are the selectivity and the rate of the harvest.



Horn growth in bighorn sheep rams can vary tremendously according to habitat quality, forage conditions, genetics and many other factors. The top ram is a 4-year-old, the bottom one is over 10 years old, yet horn size is about the same”

Unfortunately, these results have been received with hostility by some in the trophy hunting community, partly because they have been used by anti-use groups to suggest that any kind of trophy hunting will have undesirable evolutionary consequences. That is not the case.

Instead, I have argued that the specific biology of mountain sheep, combined with very heavy selective hunting, sets up a perfect storm that is very likely to lead to an evolutionary response. I have encouraged researchers and managers to consider when selective harvest may lead to evolution, and

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how to ensure that harvests are evolutionarily sustainable. Managers are instead increasingly confronted with manufactured uncertainty (see Boan et al. 2018 for a discussion of similar techniques to discredit caribou conservation) in attempts to prevent them from using the best science to develop harvest plans.

A good example is the recent attempt by wildlife biologists in Alberta to change bighorn sheep hunting regulations based on strong evidence that the current harvest scheme selects for small horns. That recommendation was refused by the provincial government and the report supporting it remains in 'draft' stage after 3 years!

The latest manifestation of hostility towards the idea that intense, quota-free selective hunting may lead to evolution is found in three papers recently published in a 'Special Issue' on mountain sheep in the *Journal of Wildlife Management*, including an Editorial Comment (Boyce & Krausman 2018) to which I have written a reply (Festa-Bianchet 2018).



The same ram as in the first photo - with his offspring - but here is 9 years old (Photo taken in) 2016. Photo Credit: Marco Festa-Bianchet

Another paper in this issue, questioning the idea that selective hunting can lead to evolution, contained several basic errors. When those errors were pointed out (Kardos, Luikart & Allendorf 2018), the author admitted that bighorn sheep hunting regulations in Alberta may in fact have caused an evolutionary response (Heffelfinger 2018).

I trust that most wildlife managers and conservationists will consider the evidence for evolutionary effects of selective hunting and neither attempt to simply obstruct it, nor abuse it by applying it out of context.

A similar article was first published in Caprinae News, the Newsletter of the IUCN/SSC Caprinae Specialist Group, issue 1/2018 (September). To see the original article including the details on the

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