

# SEX AND THE DEER FAMILY

SCIENCE BLASTS

**My previous column in *Fair Chase* described important research published by professional members Drs. Terry Bowyer, Vernon Bleich, and others. The focus of that column was on harvest of ungulates and metrics they developed to improve management. Embedded in their paper was reference to other research they have been engaged in related to spatial segregation of sexes in polygamous species of Cervidae (the deer family) and other ungulates. Spatial segregation of sexes refers to differential use of habitat or food by females and males—separated in space across the landscape. Polygamous species include those we are quite familiar with: whitetail and mule deer, elk, and moose, where one male may breed several females.**

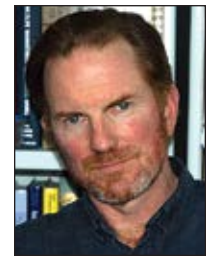
Polygamous cervid species display what biologists term sexual dimorphism,

meaning the two sexes exhibit differences in some physical features. In the case of cervids, this is represented by males typically having larger body size than females. This is true of many species of mammals that are polygamous. Reverse sexual dimorphism, where females are larger than males, occurs in many bird and fish species, as the larger size allows females to produce more eggs. Only one taxonomic order of mammals exhibits reversed sexual dimorphism—bats. Bats do not lay eggs, but their single offspring literally hangs onto them while they hang in their maternal roosts, and some bats have more than a single young. Bats may be monogamous as well, and the energetic costs of producing eggs by females outweighs the cost of sperm production in males. With cervids, the advantage of size in males is related to competition among males for

securing females during the rut. Hunters who rattle antlers or use grunts and other calls are well aware of this.

All of the above does not explain why cervids may sexually segregate at times of the year other than the rut. Many hypotheses have been put forward, and most do not add up. Bowyer and Bleich, along with Professional Member and Boone and Crockett Chair at Texas A&M University Dr. Perry Barboza have contributed meaningfully to our understanding of this behavior. As I mentioned, the paper by Bowyer and Bleich referenced in my previous column alludes to sexual segregation in cervids because understanding the phenomenon has management implications.

Of all of the theories put forward explaining sexual segregation, two have stood out, and their proponents have been Bowyer, Bleich and



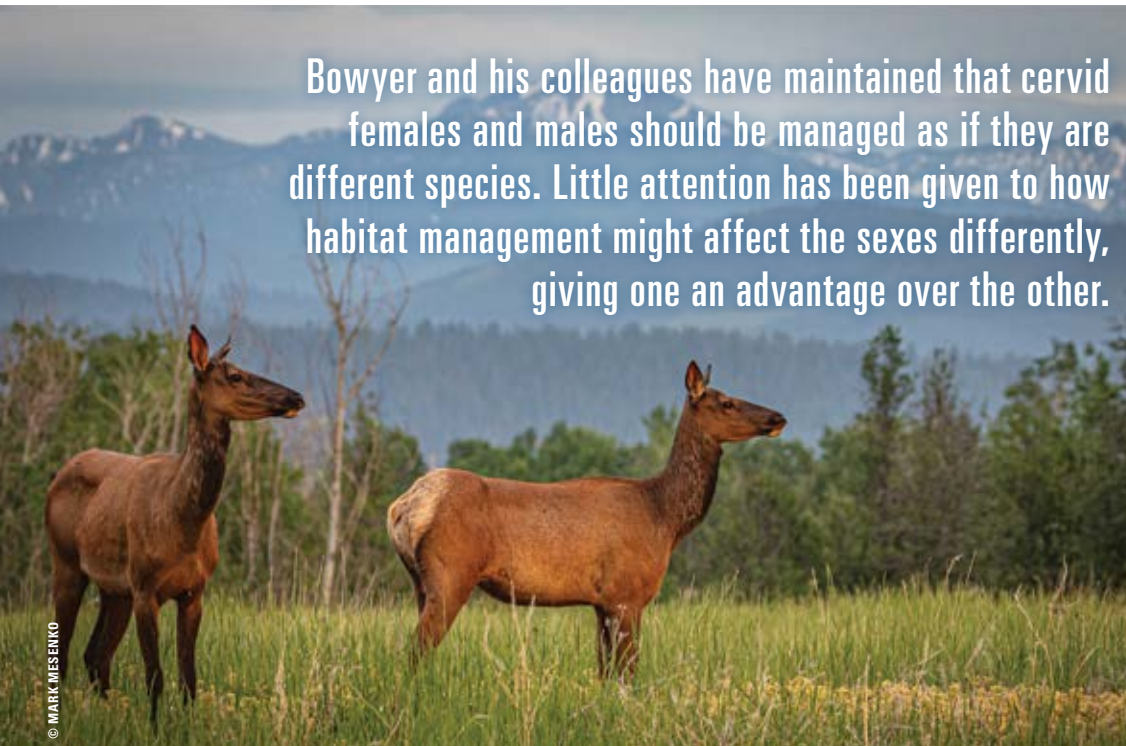
JOHN F. ORGAN

B&C PROFESSIONAL MEMBER  
Director Emeritus of the Cooperative  
Fish and Wildlife Research Units

Barboza: (1) acquisition of food resources and (2) predation. The predation hypothesis has best been demonstrated in mountain sheep by the work of Bleich, who showed that ranges of females had fewer predators and inferior food resources than those occupied by males. It makes sense to infer that females with young would select landscapes with less risk as they are more vulnerable to predation than larger males who do not have to defend young.

Bowyer and Barboza, however, have unearthed physiological differences that may unlock why this occurs in cervids. Cervids are ruminants, and ruminants have a complex digestive system that includes four chambers (“stomachs”): the rumen, reticulum, omasum, and abomasum. The rumen is the largest chamber, often referred to as the “paunch” by hunters. The abomasum is the smallest, and in cows is the source of honeycombed tripe. When deer feed, whether grazing or browsing, they are filling up their rumen with plant material that is subsequently regurgitated and chewed (“chewing the cud”) to break down further and facilitate digestion. Digestion of coarse plant material, particularly woody browse, requires a complex specialized digestive system and unique bacterial microflora.

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Male cervids, being larger in body, have a larger rumen and longer digestive system (and bigger mouths). This facilitates consumption of large quantities of relatively coarse vegetation and slower digestion in order to extract nutrients. Females, however, have smaller rumens and shorter digestive tracts. Pregnant and lactating females have increased energy demands. To compensate for these demands, pregnant and lactating females invest additional energy in increasing the size of their liver, the length of their digestive system, and other digestive organs. Rumen size also increases. Behaviorally, then, pregnant and lactating

females select areas with high-quality forage, such as emerging forbs and grasses that concentrate nutrients. These food resources are typically more time consuming to eat relative to more abundant coarse vegetation, which is likely why males prefer to eat large amounts of lower-quality forage, given their system is better equipped to maximize nutrient absorption from such forages. Think of it as the difference between going to an all-you-can-eat buffet and a tapas restaurant, where with the former you can load up on a lot of carbohydrates pretty quickly, while at the latter you can pick away at more protein over a longer time frame. In

the case of cervids, males are in the part of the landscape that contains the buffet, while the females are away at the tapas restaurant.

How does this relate to management? Bowyer and his colleagues have maintained that cervid females and males should be managed as if they are different species. Little attention has been given to how habitat management might affect the sexes differently, giving one an advantage over the other. Likewise, how does sexual segregation affect predator-prey dynamics? Differences in habitats used by the sexes can also put one sex at greater risk of human sources of mortality, such as vehicle collisions and diseases from

livestock, as Bleich has proposed for mountain sheep. This points to the need for separate survival models for the sexes for overall population modeling and consequent management plans.

As a wildlife biologist and big game hunter, I find the work by Bowyer, Bleich, and Barboza fascinating. I suspect that Club members whose fascination with big game is off the charts will find this work compelling as well. Good news then—Dr. Bowyer has plans to write a book on this topic. You can guarantee I'll be first in line to get it! ■




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