Fair Chase, Animal Husban

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A WHILE BACK

I was provided with a site on the internet where a group of hunters were discussing their elk hunting. It all had to do with 380+ point bulls — Boone and Crockett scores — and where to find them. This is just one bit of evidence of how high the demand can be for trophy elk. The prices that are charged on the San Carlos Apache Reservation for an elk hunt are $12,000 per hunt, with a trophy fee of up to $40,000, depending upon the size of the bull. On the White Mountain Apache Reservation, the waiting list is three to four years, and sealed bids for three elk hunts went for $26,000. The competition for big whitetail bucks is at least as great, if not more so. Rates in south Texas run from $2,000 to $10,000 per gun. So while the general public is not enamored with trophy hunting, and sport hunting in general is under attack, demand for trophies seems unabated.

Further, big game hunters are the main source of revenues for state agencies. In the Rocky Mountain states, elk hunters, particularly nonresident elk hunters, provide over 50 percent of the license dollars. Elk hunters provide huge revenues to the communities and businesses that cater to them. The bottom line is, big game hunting is big business. And as is often the case in issues dealing with natural resources, economics has significant influence on management strategies, often precluding use of the best biological information available. However, I propose to address ways that scientific knowledge is being used to manage for bigger and more trophies, and draw a connection between this and standards for fair chase. Then, I address the problem of defining that inexact line where wildlife management ends and animal science begins.

First, the state and federal agencies have been involved in the business of regulating hunter behavior for the entire century and establishing some minimum standards for fair chase. Initial restrictions on hunting at night, with spotlights, and wasting meat, have been with us for years. We don't kill sows with cubs, lions with kittens, and many resist harvest of females, much to the chagrin of those trying to manage populations more effectively. Colorado recently defined muzzleloading rifles more strictly in an effort to take the technological improvements out of the field. Idaho restricts rifles to less than 16 pounds so we can't hunt the canyons with the military .50 caliber and try to kill animals at 1,000 yards. We restrict ATVs, 4X4s, close roads to provide cover for the quarry and improve the quality of the hunt, whatever "quality" means. None of this is done without controversy, but the intent is to either manage populations more effectively by making the hunt more difficult or else to eliminate practices and equipment that are perceived as not appropriate for the hunt. These types of restrictions on hunter behavior are generally understood, if not always accepted, as attempts to provide best recreational opportunities while considering the resource, and to hunt in

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whatever is perceived to be acceptable behavior for most of the hunting community. So regulations incorporate elements of the fair chase concept at some level.

About 40 years ago when I left college, I seriously considered trying to hire myself out to one of those big Texas ranches where the deer were abundant, to attempt to manage the deer herd and improve the quality of the antlers. I had read Jim Teer's wildlife monograph about the Llano Basin whitetail, and the drought-related die-offs that W.P Taylor wrote of in the 1940s. I was up on C.W. Severinghaus' studies in New York, Ilo Bartlett's work in Michigan, Ernie Swift's work in Wisconsin, and I had devoured Leopold's writings. The basic idea was traditional: hunt the doe segment of the population down to some level, monitor antler development, buck weights, fawn production and survival, age structures of the male segment, and forage conditions. And when many of the bucks were living to some age beyond five or so, and were regularly producing antlers of some specified large size, the boss would like that and I would be a successful manager. One could, I reasoned, make a living doing this on private lands. Of course, I found out that this was actually going on then and has been going on more since, and we have wildlife biologists who in fact do work on private lands with the objectives of providing sport hunting for the owners and guests, paying or otherwise. This has been the practice in central Europe for over a century, and we simply see this now being applied in the United States. The Komarek brothers were among the more well known biologists to engage in these endeavors, albeit with strategies appropriate for the bobwhite quail. The point is, professional wildlife managers have been working on private lands to provide wildlife for hunting for some time, with obvious economic incentives, an entirely acceptable endeavor.

I was brought into the professional world strongly opposed to any sort of artificial feeding programs, use of salt, or anything else that unduly intruded on the wildlife resource. I subscribed to the idea that good population management and habitat management should suffice, and other activities were excuses and subterfuges not to do the "right thing." I have always felt that the first obligation of the wildlife biologist was to keep wild things

Leopold cautioned us about wildlife management being an extensive effort to guide natural trends and not an endeavor in animal husbandry. In his epic *Game Management*, written in 1933, he wrote of the need to "...avoid artificiality in the manipulation of natural processes for conservation purposes."

Photograph by Neal Mishler

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wild, as with many who studied Leopold's writings, and I had a view of what constituted "good" game management, a restrictive, western states' view of the issue, where public lands prevail. However, I consider the deer management programs in the southeastern United States intended to improve buck survival, and increase the productivity of populations using combinations of doe harvest and antler restrictions to be a logical and defensible outgrowth of these concepts.

Of course, since Leopold's time, a good share of the wildlands where we hunt big game have been substantially modified, without wildlife in mind. The commercial tree farms that harbor deer and elk are examples, but this includes most forests on public lands. Nevertheless, plantings these days on rangelands often incorporate alfalfas and other crops that are palatable to wildlife, and of course there are food plots purposefully established to benefit game. The clovers and other seedings that are applied to logging roads after they are "put to bed" are attractants to a multitude of wild animals and birds. These artificial habitats and practices are typically used to ensure the presence of wildlife and are not intended to alter carrying capacities appreciably beyond what the area would otherwise sustain. Wildlife populations may either be left to fend for themselves or are subject to manipulation by harvest on these lands, with the effort being directed primarily at habitat modification.

But what about supplemental feeding? The intent of supplemental feeding is to artificially increase the carrying capacity of the habitat beyond what it would otherwise be, especially during the severe winters or the prolonged droughts that cause declines in populations and condition of individual animals. Some would also feed supplemental minerals and rations with the intent of growing bigger-antlered bucks. We now see major sporting goods suppliers providing deer feeders. You can buy deer feed, mineral blocks, etc., and these items are not just being bought by the backyard deer lover. Well-intentioned sportsmen still lobby the state agencies to feed deer, elk, and antelope whenever there are damage problems or severe winters. Brucellosis and other diseases are more likely to proliferate on feed grounds, but the main problem with feeding is that the deer don't just eat the food provided. They concentrate and may damage range, and regardless are maintained at levels above what would have occurred without the supplements.

Are food plots established for wildlife acceptable practices, as compared with presenting corn, alfalfa, or pellets at a feeding station? Establishing food plots is probably acceptable to most, since animals are required to forage as they would if the plants were naturally established. If the food plot is essentially an effort to concentrate animals for purposes of hunting them as if they were using a bait station, there is justifiable criticism. But the arguments about whether deer and elk that are kept at artificially high levels through supplemental nutrition and whether this is too severe an intrusion to be judged inappropriate, will continue. Suffice it to say that the practice is common, highly variable in application, and obviously acceptable to many. But is feeding supplements to deer in feeders with the intent of increasing antler size consonant with the principles of fair chase? I think not.

Management using information developed from the study of deer and elk nutrition and genetics can be used in many ways. We see supplemental feeding and supplemental use of mineral blocks with the intent of growing large-antlered bucks and reducing the effects of drought and severe winter on the deer. Biologists working for the Colorado Division of Wildlife have developed rations that will keep deer healthy during the most severe winter. While they did not advocate use of the ration except in emergency situations, the temptation to use it or something like it on a more permanent basis is obvious, as the experience in central Europe with red deer illustrates. In Austria, winter supplemental feeding is required by law. The pelleted elk ration supplied on the National Elk Refuge has extensive study behind it. So we now have the capability of providing deer and elk with high levels of nutrition over extended periods, thereby keeping individuals in better condition and at higher densities than would

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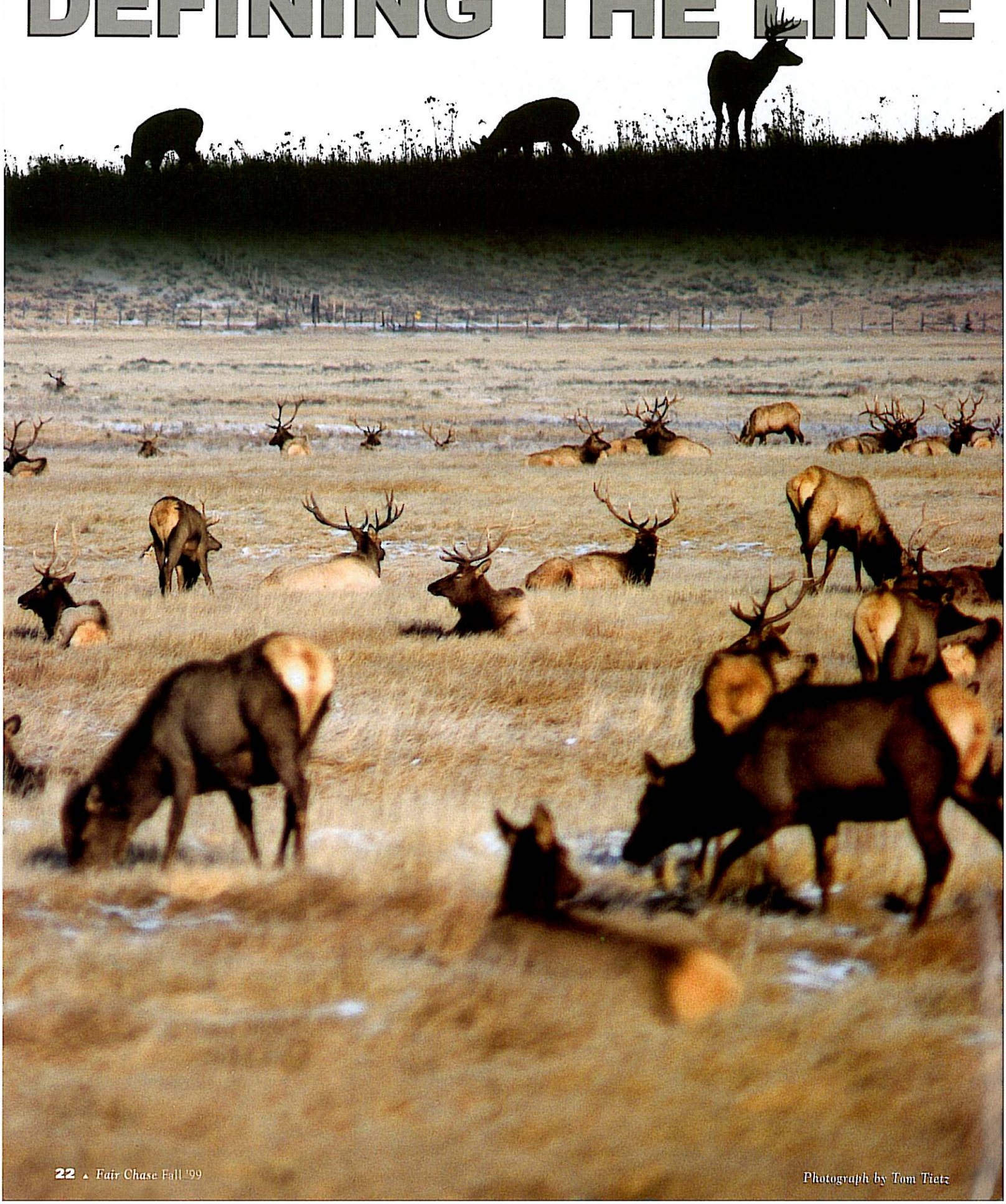

Photograph by Tom Tietz

occur without our intervention.

Selective culling, such as is being done in central Europe, is an easy next step to influencing the genetic composition of the deer populations. In situations where immigration and emigration may be controlled, one can expect to see genetic changes in deer populations resulting from manipulation of individuals, such as is being done with trees. Foresters "weed" the crooked trees from the forests, public and private, and most view that practice as entirely justifiable. Ranchers cull the less productive ewes and cows from their herds. Why should one worry about doing the same with deer or elk?

Our native bison illustrate how genetics can change when individual populations are isolated over time. Renee' Polziehn and her colleagues at the University of Alberta examined aspects of the genetic makeup (mitochondrial DNA haplotypes) among nine populations, originating from at least nine different areas. The study was designed to investigate differences between wood bison and plains bison, and the researchers discovered more genetic variation between individual herds of plains bison than they did between the plains bison and the wood bison. These plains bison had been isolated from each other for substantial time periods, although some herds were recipients of genetic material from more than one source. Still, they identified bison at Custer State Park and the National Bison Range as being most genetically similar to each other, while the Fort Niobrara Wildlife Refuge and Yellowstone National Park populations were closely related. Wood bison from Elk Island National Park, Wood Buffalo National Park and the Mackenzie Bison Sanctuary had a common gene pool, although there were unique genotypes in each of these parks that warranted managing them apart from the plains bison complex. But individual herds can be identified on a genetic basis as being different from each other, and at least part of the reason lies in the isolation and genetic drift that can occur as a result.

Joel Berger and Carol Cunningham documented that two separate lineages of bison introduced to Badlands National Park, South Dakota, differed in growth rates, with higher winter mortality and decreased lifetime production of young in the slower growing line. Bison are probably adapted to the different climatic and vegetative conditions across their original huge range and the suggestion that some lineages may not adapt as well as others to certain habitats is further evidence that the genetic makeup, as well as the behavioral responses vary and have significance.

The investigations of Gunther Hartl and his colleagues in Austria with red deer further demonstrate that the genetic makeup of antlered game may be altered by differential hunting pressures. Selection for large body size, high number of antler points, and large spikes in yearlings has been integrated into the hunting laws of many central European countries. Three distinct red deer populations from eastern France were investigated. One population of about 2,750 animals was subjected to selective culling. Another population was subjected to extreme hunting pressure against small spikes in yearlings. A third population was subjected to high hunting pressure towards an increase in number of points but not against small spikes. These populations were isolated from each other although the latter two originated from the first one. Changes in certain genes could not be explained simply by genetic drift, but could be by the pressure against small spikes. Heavy hunting pressure against carriers of the small spike trait can totally eliminate that trait from the population. Hunters were rewarded for killing a small spike by obtaining permission to shoot another animal. Hartl concluded by saying that some alleles may be lost by directional hunting pressure, which may not be reflected in a decrease in overall heterozygosity, but may be dangerous in intensively managed species. In other words, the gene that produces a small spike bull may have adaptive significance that is lost when natural selection is altered to favor genes promoting bigger antlers. Regardless, for the purposes at hand, hunting pressure is known to be capable of altering genetic makeup of red deer in central Europe, and over relatively short periods of time. Research in Scandinavia corroborated these findings.

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Valerius Geist, in a lecture given at the University of Idaho in 1996, pointed out that efforts to grow large-antlered red deer in Germany in the 1930s met with failure because the biggest-antlered deer were poor breeders. It would not be surprising if eventually a tie between the gene complexes that control antler configuration and size and breeding is found, given that antlers are secondary sex organs that are involved in breeding success. However, it is known from the work on red deer in Scotland and from moose investigations in Denali

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National Park, that the largest-antlered males are not always the most successful breeders, so the relationships, if they do exist, are complex.

New Zealand red deer farmers are well aware that the heaviest stags within an age cohort produce heavier velvet antlers with high heritability. Work done by G.H. van den Berg and D.J. Garrick at Massey University in New Zealand, published in Livestock Production Science in 1997, is an example. In their investigations of 2,021 stags with two-year velvet records from five farms, heritability estimates were actually correlated more than phenotypic parameters with antler size and weight, although adverse environmental conditions (severe winter) had obvious effects. The deer and elk farmers have an incentive to keep their captives well fed and to cull the small ones.

It should be no surprise that a substantial amount of research into the genetics and natural selection of deer has been done in the southern states where big-antlered bucks are in high demand and there is plenty of privately-owned land. Harry Jacobson, when at Mississippi State University, kept a herd of whitetails obtained from a variety of places. Harry kept all the shed antlers from individual bucks so he had complete lifetime records. Some bucks that were on low quality forage and produced spikes as yearlings subsequently produced large antlers as the forage supply they obtained was improved. Some yearlings on good forage produced the 8-point antlers more typical of adult bucks. When I visited, he pointed to a scrawny doe and a nice fat doe and asked which one did I think produced the bucks with the biggest antlers. You guessed it: the scrawny one consistently produced larger-antlered bucks. While much of Harry's efforts demonstrated the value of high quality forage in producing large-antlered deer, a phenotypic response, he also demonstrated that individual deer had different abilities to produce offspring with large antlers.

Work on the genetics of southern deer revealed that the extensive reintroductions of the 1930s and 1940s from other areas may not have contributed much to the genome in the region. Darrell Ellsworth and colleagues, published in *Evolution* in 1994, revealed that the deer in central Florida could be identified as having different genetic makeup than deer from the north Florida-Georgia-Alabama-Mississippi area. These deer appeared to be one huge interbreeding deme. However, A.A. Karlin and his associates did identify northern genes in deer in Arkansas, suggesting that the earlier introductions of more northern deer may have affected the genome in that area. Either the genes from deer introduced from other areas were eventually swamped out by the most adapted genome, with some residual differences still being detectable more locally, or those introduced deer were not very effective breeders. The evidence points several ways thus far.

Some Texas work directly examined the influence of nutrition and heritability of antler characteristics. Texas Parks and Wildlife Department reported results of research on penned deer covering a 1973-1985 period. Donnie Harmel, John Williams and Bill Armstrong manipulated the diet of penned deer, and kept records on bucks produced by different sires and dams. Their results indicated that body weight and antler characteristics respond in direct proportions to diet quality, that antler characteristics and body weight are phenotypic characters influenced by both genetics and nutrition, yearling spike-antlered deer are inferior to fork-antlered yearlings with regard to body weight and antler characteristics and will remain so, and body weight and antler characteristics appear to be highly heritable characters.

A subsequent publication reported three different estimates of heritability of antler characteristics from the penned experiments that used single male breeding pens with 10-14 does for five consecutive generations. Antler points and spread were less heritable than main beam length or basal

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Photograph by Neal Mishler

circumference. Antler weight was most heritable. "These heritabilities... suggest that substantial genetic change could be expected from individual selection if realistic selection differentials were used" (Williams Krueger and Harmel, 1994, Heredity). The selection differentials would presumably be culling of spike bucks and providing adequate nutrition for the population.

Earlier investigations by Michael Smith and his colleagues at the Savannah River Laboratory in South Carolina also demonstrated the heritabilities of antler characteristics. Much of this work was intended to address the merits of managing against spike bucks or protecting them, and the conclusion is that efforts to protect spike bucks and concentrate harvests on multiple tined bucks would be counterproductive. These studies have implications for elk populations with highly reduced male age structures, and management directed at specific age classes, that are being tacitly ignored. When hunting pressures approach levels that seriously reduce male survival, the sport of hunting is subject to criticism.

It should be obvious that substantial knowledge is available on the heritabilities of antler characteristics and our abilities to manipulate those heritabilities from these investigations. And so it should come as no surprise to see some who own substantial lands with deer and/or elk on them try to take advantage of this. First, the idea is to fence the property so the deer inside are isolated from other deer. Then one would feed them supplements to keep them on a high nutritional plane. Then one would cull the female segment and the spike bucks, likely using paying hunters, and then limit harvests on the adult buck segment to levels that ensured survival to ages where maximum antler development is attained.

Alternatively, introduction of captive large-antlered bucks and bulls to females during rut is practiced. And in doing so, the genetics of the population may diverge from the original stock, and natural selection may be altered in favor of producing big bucks. The timing and degree to which genetics will be altered

would vary with size of the herd, intensity and kind of management, and is related to size of the ranch.

In Texas, where substantial effort to manage breeding for antler size occurs, what are the actual consequences? Jerry Cooke, big game program director for the state, pointed out at the 1998 conference of the Texas Chapter of The Wildlife Society that these efforts were very likely doomed to fail. The frequency of antler characteristics within a deer herd reflect "what is fit," with neither extremely large nor extremely small dominating. Increasing the frequency of extremely large antlers simply increases the number of individuals that are less fit. Also, modeling a population demonstrates that the intensive culling needed to change gene frequencies disrupts age structures, which obviates the attempts to manage the genome by destabilizing the population and making older age classes (which produce the best antlers) problematic. Multiple genes are involved in antler size and configuration, and the management has to be so intensive and sustained as to be largely impractical. When selective pressure is removed from these culling programs, gene frequencies can be expected to return to "what is fit".

Nevertheless, people are attempting to grow bigger-antlered deer by selective breeding and culling. Most of these attempts are obviously ill-conceived, but the European experience with red deer and the bison studies suggest that over long periods of time, with discrete populations of relatively small size, the genome will diverge, and efforts to hasten or direct the process may be effective. Also, people who are engaged in these attempts are deliberately trying to manipulate the genome, regardless of whether they succeed or not. Is this wildlife management or animal husbandry, and are the results in terms of animals produced and shot to be considered fair chase, comparable with animals whose genome is not deliberately modified?

Efforts to maintain thrifty deer populations and productive habitats by keeping the does at numbers that foster these goals, and by developing forage and otherwise manipulating habitats to favor deer, are acceptable to most of us. This is merely a matter of keeping the landscape healthy, by retaining the diversity and productivity of the plant community. This is ecosystem management at some level, because if the diversity of the plant community is maintained, the habitat for other species is likely maintained as well and the deer will not have unduly altered it. Habitat and population management at this level is likely seen by most if not all of us as entirely acceptable, if for different reasons.

But what about applying animal husbandry techniques to wildlife populations in order to increase antler size? At the point where the genetic composition of the population is altered, I question whether the product is wildlife in the real sense or not, because we have interfered with the natural selection process. I suggest that this is where animal husbandry starts and wildlife management ends. Wildlife management is intended to foster the natural selection process, not interfere with it. And, fair chase probably ends at the same point as does wildlife management.

So now we come full circle to what constitutes fair chase and to what degree should wildlife management become animal husbandry in order that hunters can pursue a big bull or buck. If you are a dedicated trophy hunter, then you may support hunting behind locked gates for genetically improved bucks or bulls. But are you supporting some kind of animal husbandry applied to the management of the resource, and is the management too intensive? Are these animals you hunt really wild, or are they the result of intensive manipulation that would not occur in less intensively manipulated populations? Are these kinds of bucks and bulls really wildlife?

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And finally, is it really fair chase to hunt these kinds of deer or elk behind fences, no matter how big the area circumscribed within the fence? Obviously, the quest for trophy bucks and bulls is what drives these practices. Those who participate should realize they are subject to serious criticism by those who are opposed to hunting, on fundamental biological grounds. Ted Kerasote pointed out that many who dislike hunters dislike them for their dishonesty. Efforts to artificially raise trophy animals under the guise of better game management are dishonest.

Leopold cautioned us about wildlife management being an extensive effort to guide natural trends and not an endeavor in animal husbandry. In his epic *Game Management*, written in 1933, he wrote of the need to "...avoid artificiality in the manipulation of natural processes for conservation purposes" (page 396). Thus, wildlife management is the business of keeping wild things wild. Hunters would do well to recognize the connections between fair chase and wildlife management, as opposed to animal husbandry, and seriously consider the consequences of ignoring the relationships, both for the resource and the hunter. ▲▲▲