Game species: extinction hidden by census numbers

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Abstract

Game species: extinction hidden by census numbers.— Management of game species may involve a risk of alteration of their genetic properties. Local adaptations may be disrupted if artificially selected individuals from farms or those belonging to distant geographical areas are introduced to increase population density or trophy "quality". In Spain, red deer (*Cervus elaphus*) from different European subspecies have been introduced to increase the size of trophies (antlers) of local populations. Legislation against these introductions is not effective for various reasons, and once the individuals are in the Iberian peninsula it is virtually impossible to prevent their spreading throughout the whole territory without a genetic tool to distinguish between autochthonous and foreign specimens. We have developed such a genetic test and propose a strategy to dissuade land–owners from importing foreign deer. Since deer are bred mainly for their antlers, our strategy is based on an agreement with the National Trophy Body in Spain which rejects trophies from foreign populations. Rejection decreases the value of the trophy so that it becomes more profitable to produce autochthonous deer. Using such a strategy at some critical step in the production or commercialization process may be a good model to apply in protecting genetic properties of exploited species.

Key words: Game species, Red deer, Genetic variability, Hybridization, Conservation, Trophy.

Resumen

Especies de caza: procesos de extinción ocultos tras elevados tamaños de censo.— La gestión de las especies de caza puede conllevar riesgos de alteración de sus propiedades genéticas. Las adaptaciones locales pueden deteriorarse si ejemplares producidos mediante selección artificial en granjas o procedentes de áreas geográficas distantes, son introducidos para aumentar la densidad poblacional o la "calidad" de los trofeos de caza. En España, se han introducido ejemplares de ciervo ibérico (*Cervus elaphus*) procedentes de distintas subespecies europeas para aumentar así el tamaño de las cuernas (trofeos de caza) de las poblaciones autóctonas. La legislación contra este tipo de introducciones no es eficaz por diversos motivos y, una vez introducidos los ejemplares en la península ibérica, es prácticamente imposible prevenir su dispersión por todo el territorio sin contar con herramientas genéticas que permitan diferenciar los ejemplares autóctonos de los foráneos. Nosotros hemos desarrollado un test genético para este fin, y hemos propuesto una estrategia para disuadir a los propietarios de llevar a cabo la importación de ejemplares foráneos. Puesto que los ciervos se crían fundamentalmente por su cornamenta como trofeo de caza, nuestra estrategia se ha basado en un acuerdo con la Junta Nacional de Homologación de Trofeos de Caza, para que ésta rechace los trofeos pertenecientes a ejemplares foráneos. Este rechazo reduce el valor de los ejemplares procedentes de otras poblaciones y favorece la producción de ciervo autóctono. Sugerimos que la utilización de estrategias de este tipo en puntos clave de procesos de producción o comercialización, puede ser un buen modelo a aplicar para proteger las propiedades genéticas de las especies sujetas a explotación por el hombre.

Palabras clave: Especies de caza, Ciervo ibérico, Variabilidad genética, Híbridos, Conservación, Trofeos cinegéticos.

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In many natural areas, hunting is a traditional economic activity that may be fully compatible with conservation of autochthonous game if sustainable management practices are established. However, in view of the fact that many game species have a wide distribution and large populations, it is often considered that hunting and other related management practices can be continued without the need to take ecological and genetic parameters into account. Indeed, the growing economic interest in hunting promotes practices that aim to increase census size as well as to improve (from a human point of view) some of the animal traits, but such measures may endanger the conservation of other natural features of the species or populations. A good example of this is the risk of hybridization after individuals are released into natural populations for hunting purposes.

In general, hybridization as the result of human release of farm–reared individuals or exotic species or subspecies is a serious conservation problem, particularly among exploited animal species. The generally negative consequences of hybridization have been widely acknowledged and reviewed (RHYMER & SIMBERLOFF, 1996; ALLENDORF et al., 2001), and are related to the reduction of fitness in hybrids, the distortion of the genetic structure of populations and the disruption of locally co–adapted gene complexes. Hatchery–reared fishes, such as the Iberian brown trout are a clear example. The introduction of hatchery trout is genetically homogenising the populations in the Iberian peninsula, distorting ancestral patterns of genetic variation (MACHORDOM et al., 1999). Further examples can be seen in farm–reared game species. It is simple and frequent practice on farms to hybridise different subspecies, artificially selecting individuals with the desired phenotypes (see www.universalgamefarm.com or www.suwanneeriverranch.com). After their release, they may genetically contaminate the locally–adapted wild populations with foreign or artificially–selected genotypes. Farm deer, for instance, are selected for release into natural populations for hunting purposes according to antler size, as larger antlers represent more highly valued trophies. As a consequence of this practice, throughout Europe autochthonous deer are hybridising with released specimens which may be foreign or artificially–selected. This may account for the hybrid red deer subspecies, originally occurring in Central Europe, which clearly jeopardises the genetic integrity of each subspecies. Although it is important, this problem is more easily overlooked than the case of hybrids arising from the introduction of exotic species or their escape from farms or enclosures, as in the case of the introgression of sika deer (*Cervus nippon*) genes into the gene pool of native Scottish red deer (*Cervus elaphus;* GOODMAN et al., 1999), or the hybridization between white–tailed deer (*Odocoileus virginianus*) and mule deer (*Odocoileous hemionus*), or between exotic red deer and elk (*Cervus canadensis*) in some areas of the United States (DERR, 1991, ONTARIO FEDERATION OF ANGLERS AND HUNTERS, 1991).

The problem affecting European red deer has already reached the Iberian subspecies (*Cervus elaphus hispanicus*). Deer with larger antlers are more profitable for owners of hunting estates, which encourages them to introduce specimens from other European subspecies into their properties. The introduced individuals can reproduce and hybridise with local deer, and are permitted to be moved within Spain and Portugal. On some estates, non-autochthonous deer have intentionally been hybridised with Iberian species under controlled conditions, and hybrids may be purchased by other estates to "improve" the quality of the trophies in their populations. This practice represents a silent but true extinction risk for the Iberian red deer subspecies.

After hunting a big stag, the trophy class is determined from a rate table based mainly on antler size and width and number of tines. Trophies are ranked and given prizes (gold, silver and bronze medals). The ranking of trophies is controlled by the Spanish Trophy Measurement Body (Junta Nacional de Homologación, JNH), which depends on the Ministry of the Environment. In the present study, a strategy to preserve Iberian red deer genetic identity has been developed, with possible application to other similar cases. The specific objective of the present project was to provide the JNH with genetic markers to identify trophies belonging to foreign deer. Two types of genetic markers were developed. The first is a dominant multilocus marker, that is, presence/absence of bands depending on the subspecies studied (similar to DNA "fingerprinting" but by PCR amplification) and, the second is a variant of the RFLP–PCR assays (codominant marker) using different restriction enzymes. These two procedures show a range of different genotypes as a result of subspecific polymorphisms (Fernández–García et al., unpublished data). The JNH has decided to apply this test to trophies and those proving to come from introduced deer will be rejected from the Spanish ranking. Rejected trophies will lose their value and it is expected that owners will thus be dissuaded from importing foreign deer. Although the rejection of such trophies may represent a setback for the economic activity on some estates, it is considered that promoting the production of autochthonous, wild–reared red deer will be beneficial for big–game producers in general, since Iberian red deer could be promoted as an exclusive product to international hunters. Conservation of many natural areas in Spain depends on the adequate exploitation of natural resources, including hunt-

ing. Increasing the value of natural products may contribute to conservation if their exploitation is more compatible with the preservation of biodiversity than alternative uses of the land, such as livestock or agriculture.

Other game species are equally threatened. Roe deer (*Capreolus capreolus*) is also being introduced from foreign populations. The wild boar (*Sus scrofa*) is being crossed with the domestic pig to increase the number of offspring per litter. It is produced under controlled conditions and the hybrids are released to the wild. Both cases are big–game species and the same strategy could be applied as there are trophies which are submitted to the JNH. Genetic markers for these are currently being developed. However, there are other well-known examples such as the red partridge (*Alectoris rufa*) which is hybridised on farms to provide thousands of individuals for the increasing demand for massive hunting. In these cases, the "trophy–rejection" strategy is not applicable, but some other type of control can surely be implemented.

Although the examples presented here refer to game species, similar guidelines may be used in other conservation tasks regarding exploited species all over the world. A key to the present project was to identify a bottleneck in the management process of a species or its products, and to design a strategy which in some way would determine the quality of the original product in agreement with competent authorities.

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