

# Genetics, Nutrition and Age – the driving forces behind quality trophy production



## Introduction

The many rock paintings and engravings showing over-sized animals with long horns clearly demonstrate man's longstanding passion about large sized (trophy) animals. What probably started out as way of thanking the gods for providing the hunters with exceptional animals, subsequently developed into trophy mania, which achieved its peak in medieval central Europe. Huge red deer antlers were used as gifts of state and antlers were valued as objects of display in castles. Hunting excursions of nobility were recorded in detail.

The over-exploitation of wildlife in central Europe during the late 19th and early 20th century led to declines in the trophy quality of antlers. This gave birth to the "Quality Deer Management" movement which had an intense interest in how to produce huge trophy antlers. The problem was solved primarily by the culling of males with inferior antlers and sparing those with good antler growth. The "culling of undesirables", was made popular by Ferdinand von Raesfeld's 1899 publication "Hege mit der Büchse" (husbanding with the rifle). This approach was subsequently institutionalized in Germany's 1934 wildlife management legislation. Much of the information presented in this article stems from research performed by a similar "Quality Deer Management" movement currently active in the United States.

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As we are all very aware, anti-hunting lobby, does its level best to wipe out hunting (trophy) as a sport and use every weapon available to do so. Little do they care about the fact that the hunting industry is the main reason behind the massive shift from stock to game farming and increased conservation effort. Hunting contributes significantly towards the conservation of natural habitats and wildlife in general. However, ignorance and/ or greed on side of game ranchers, hunting outfits and hunters alike results in many questionable game management practices ranging from overexploitation of trophy animals to outright criminal and fraudulent activities. This adds fuel to the fires of the anti-hunting lobby and will, in time, threaten the continued existence of good quality wildlife.

We as game ranchers in Southern Africa must take note of the problems facing our industry, learn from lessons of the past and apply current information available to us.

Trophy (horn or tusk) production is regulated by age, nutrition, and genetics. The solution to optimal trophy production incorporates all three factors, with an emphasis on age and nutrition. The goal of this article is to clarify the basic influences of these factors on horn development and then discuss how they may interact in the ultimate expression of trophy quality on your game farm. You will realise that significantly improved trophy development can be achieved through good management principles adjusted to local conditions.

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## Age, the easiest way of improving trophy quality

Any trophy-producing animal will follow a roughly predictable pattern of horn/tusk development with increasing growth up to a certain age (species dependent). After that time, the ravages of age usually begin to show in a declining trophy size (e.g. wear or fractures of horn or tusk tips).

The only and easiest way you can influence trophy development with regard to age is not to harvest animals before their optimum age. The age at which one can expect to see some animals in record-book proportions depends on the species in question, but is rarely sooner than 4 years of age. Allowing males with exceptional (genetic?) horn development to reach their full potential (age) obviously has, as secondary spin-off benefits:

- a) You get the opportunity to identify these truly magnificent animals.
- b) They have plenty of opportunity to breed and thus disseminate their genes in your herd.

It is further important to realise that animals on sub optimal nutrition (e.g. on over stocked game farms or those born prior to or during a drought) will reach maximal trophy size at a later age and will be more severely affected by seasonal variation in food availability.

**Message: Irrespective of the buck's genetic potential, trophy size increases every year until the wear of age starts to show.**



Figure 1 This picture shows 3 complete sets of antlers from three different deer arranged from yearling at the bottom to the oldest set at the top. All were fed unlimited amounts of a high protein diet. © [Texas Parks and Wildlife Department](#)

## Genetics as a tool in trophy production

Just like people, animals are born with a genetic code that dictates what potential their characteristics have, including horn development. Some bulls/rams are destined to become monsters while the majority will grow into "average" bucks.

Research in white-tailed deer showed heritability values for various trophy characteristics to vary between 0,42 (antler spread) to 0,75 (antler weight) where values of 0,3 and 0,5+ are respectively considered moderate to highly heritable. (The heritability estimate of weight gain in cattle ranges between 0,3 - ,04).

However, it is vitally important to remember that an animal's environment (quality of his habitat and nutrition), and his age to a very large extent affect the physical expression of his genetic potential for trophy development. Nature has a way of preserving the species by ensuring that the strongest specimens propagate the next generations "survival of the fittest".

**Note:** Since **nature does not manage species for trophy production**, the "survival of the fittest" adage does not necessarily mean that huge bulls are dominant breeders (e.g. Kudu bulls with huge horns are less agile in dense bush and fall prey to predators more easily than cows or possibly smaller bulls).



Figure 2 Oryx in southern Namibia  
© M. Bijsterbosch

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Figure 3 Each board displays 4 generations of antlers from 3-year-old deer (from top to bottom the great grandfather, grandfather, father and son). The antlers on the left originate from deer that were fork-antlered as yearlings and whose dams were from fork-antlered sires. The antlers on the right originate from deer that were spike-antlered as yearlings and whose dams were from spike-antlered sires. © Texas Parks and Wildlife Department

### You can affect (manage) the gene pool on your farm in two ways:

- Cull animals with obviously inferior trophy potential (easier said than done since early recognition of animals with poor trophy potential is not always easy) and allow those exceptional bulls/rams on your farm maximal opportunity to breed. This is done by allowing them to mature and grow out before shooting them for their trophy. Remember, they have been born on your property (hopefully) and should be best adapted.
- Introduce new stock originating from farms with a record of producing superior trophies. Contrary to other parts of the world, game capture teams abound in Southern Africa, making this a very realistic option. The new breeding stock will also minimise inbreeding, which should be of concern to any game farmer keeping isolated populations on fenced-in properties.

As a hunter (or outfitter) in search of excellent trophies, you should do a little research into what regions/farms have been producing larger numbers of big bucks and try to hunt there. Unfortunately, many people limit their herd management to buying-in life trophy animals to then be harvested on their properties. This is a “quick fix solution” which makes it impossible to evaluate the genetic potential of the game on such properties. These farms brag with something that is not truly theirs.

Genetic potential for trophy development is of management concern if you are involved in the selective harvest of animals. Selective harvest decisions can be used to manipulate the "genetic composition" or the "standing crop" of a population.

**Management for "genetic composition"** of the population involves the active selection of animals with the genetic potential to produce large horn/ tusks (or other traits you want to select for). This can only be achieved if you can judge the genetic potential of animals and then increase the reproductive success of these superior animals. Our inability to judge a female's genetic potential for producing offspring with good trophy potential is a significant problem in this regard.

**Management of the "standing crop"** of a population can provide both positive and negative effects, depending on the approach to selective harvest. By removing “inferior” animals (this could be culling of inferior males and/or the culling of a large % of the female stock to keep population growth in check) from your herd you leave more forage resources for those not culled. This should enable the residual animals to grow larger horns. The hunter must be able to accurately judge trophy development within age classes and then selectively harvest inferior animals.

**Messages: Antlers of successive generations were either made larger or smaller through selection. Females also influence trophy production – ensure females allowed to reproduce originate from superior males.**

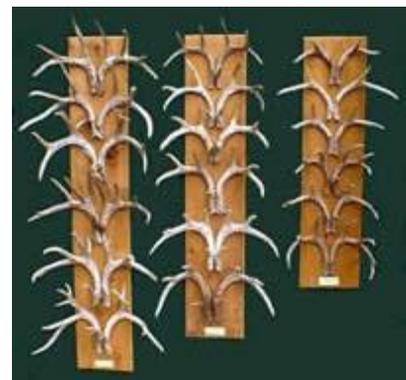


Figure 4 Eighteen sets of antlers from 4-year-old deer that were fed the same diet throughout life. The 6 sets of antlers on the left were from deer that had at least 6 points as yearlings, those in the middle had at least 3-5 points and those on the right spiked as yearlings. © Texas Parks and Wildlife Department

## Nutrition

The important role of nutrition in trophy production has already been clear since medieval times, when the huntsmen of King Edward II declared “The head grows according to the pasture, good or otherwise”.

Science has proven beyond doubt that, with proper nutrition, animals can grow dramatically larger trophies up to two years faster than they would achieve on poor nutrition. Proper nutrition has many benefits beyond trophy development, including better reproductive success and greater stress- and disease resistance.

Trophy development seems to primarily hinge on two nutritional components, protein and minerals. Over and above the direct beneficial effect of nutrition on trophy growth, sufficient forage of adequate quality to supply the nutritional needs of animals during stressful periods (severe cold or heat stress, drought) will significantly increase the survival chances of mature and older animals. This will enable them to grow even bigger trophies and places the game rancher in a position to increase his/her trophy harvest.

**Message: Feed them well, grow them big!**

## Summary

Age, nutrition, and genetics significantly influence trophy development in all species. Any management program which has trophy quality as a goal must pay attention to these factors, else it will fail.

Management emphasis should be placed first on addressing the most significant limiting factors (on most game ranches nutrition and age distribution). Providing adequate nutrition (ideally by habitat management and avoiding over stocking rather than supplemental nutrition) and promoting survival of animals to older age classes will produce the best and most cost-effective results.

The annual antler shedding makes deer an ideal species to research the effect of nutrition etc on antler development. It is quite sad that there is a complete lack of similar, well executed scientific research for southern African game species. Paging through back issues of the Game and Hunt and/or Wildlife Ranching magazines, however, it will become abundantly clear how dramatic management efforts can influence phenotypic animal traits like body size and trophy quality,



Figure 5 These are annual sets of antlers of 2 deer fed respectively on a low (left) and high (right) protein diet as follows:

Year 1: L – 10.5% prot at 2 kg/day  
Year 2: L – 8% prot at 2 kg/ day  
Year 3: L – 8% prot at 2.5 kg/day  
Year 4: L – 8% prot at 2 kg/day

Year 1, 2 and 4: R – 16% prot at 2 kg/day  
Year 3: R – 16% prot at 2.5 kg/ day  
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