

Golden wildebeest or golden gnu (*Connochaetes*).
Photos courtesy York Golden Wildebeest,
a member of Golden Breeders.



A case for COLOUR VARIANTS

A game rancher's perspective:

by Erich D. Graupner



Erich D. Graupner

PREAMBLE
The South African wild-life industry is currently grappling with a contentious issue that centres on the propagation of colour variants in a number of game species. In the popular press and even some 'scientific' papers, a perception has been created that the game-ranching industry is propagating cross-breeds of species they have created, using genetic manipulation to create these, and thus threatening biodiversity on their game ranches, where they breed animals in small enclosures. All this is 'alleged' to threaten wildlife ecosystems in South Africa.

In some instances, this viewpoint has been communicated to people and organisations outside of South Africa, presumably to drum up support for their viewpoint. One of the results of these actions is that some colour variants are not recognised by international trophy registering organisations. In the potential market, the perception has been created that South African game ranchers are genetically manipulating animals in small enclosures to be hunted by trophy hunters. This is doing serious damage to South Africa as a hunting destination involving trophy hunting tourism, resulting in direct revenue loss, not only to ranchers, but to the ranching industry and the country as a whole.

Since colour variants and their breeding seem to be the focal point of the argument, this aspect could be examined more closely.

Whether the selection is for body size, horn length, coat colour and so on, the same rules for survivability apply to the desired selection within the constraints of habitat.



White African lion (*Panthera leo*). The white lion is a rare colour mutation of the Timbavati area. White lions are the same as the tawny African lion (*Panthera leo kruger*) found in some wildlife reserves in South Africa. White lions are not a separate subspecies and were thought to be indigenous to the Timbavati region of South Africa for centuries, although the earliest recorded sighting in this region was in 1938. Regarded as divine by locals, white lions first came to public attention in the 1970s in Chris McBride's book *The White Lions of Timbavati*.
Photo © Jonathan Pledger.



Photo © Quintus Strauss. Photo courtesy Leopard Rock Game Breeders.

COLOUR VARIANTS

The question can be asked: are colour variants rare in nature (or an oddity) or manmade? A search of the literature strongly confirms they occur naturally. Not only are there records of colour variants dating back to the 1500s (white and black Bengal tigers) but they have also been recorded in a great number of diverse species ranging from invertebrates (blue lobster) to birds and mammals. Furthermore, natural colour variants in mammals occur on all continents as well as in the oceans (white killer whales).

Closer to home, there are numerous examples of natural intra-specific colour variants in naturally occurring wildlife populations. Examples are the king cheetah, the very rare fawn-coloured spotless cheetah, the yellow phase of the crimson-breasted shrike and, in the case of Wahlberg's eagle (*Aquila wahlbergi*), there is a range of colour morphs from leucistic (very light) to melanistic (very dark). This is also true of the giraffe, of course. In their distribution range in southern Africa, colour varies from giraffe with almost black markings to animals with very light, almost white colouring.

Between these two extremes there is a range of colour morphs. The white lions of the Timbavati are an example of a spontaneously occurring colour morph. This has also been observed in kudu, steenbuck and various other species.

The white colour variant is not to be confused with albinism where pigment in the skin is absent. This latter type of variant (albinism) can have serious consequences – even lethal for the carrier – due to solar radiation. Other colour variants include white, black and copper-coloured springbuck, golden and red gemsbuck, black impala, golden and copper-coloured wildebeest and the so-called king wildebeest. We also have white and various other morphs of blesbuck. In kudu, we have both

white and very dark, almost black, representatives. This is also true of felines like leopard, genet and serval, where black animals can occur in the natural population. Of all the species mentioned, there are also the commonly coloured animals that form the great majority of the populations.

From the above (not a complete list), it is clear that colour variants in naturally occurring game populations are by no means rare or isolated occurrences. Colour variants are not manmade. The observation of these animals by man, especially in larger natural populations, is often rare. In many cases, the genetics of colour variants are such that the phenotype ('look like') only finds expression in the double recessive configuration. It is thus easy for a colour variant in a natural population to appear



White Bengal tiger (*Panthera tigris tigris*) is a pigmentation variant of the Bengal tiger, which is reported in the wild from time to time in the Indian states of Assam, West Bengal and Bihar in the Sunderbans region and especially in the former state of Rewa. Such a tiger has the black stripes typical of the Bengal tiger, but carries a white or near-white coat.
Photo © Andamanec.



A male cheetah with a female king cheetah (*Acinonyx jubatus*) in South Africa. The king cheetah is a variety of cheetah with a rare mutation for cream-coloured fur marked with large, blotchy spots and three dark, wide stripes extending from the neck to the tail.
Photo © Stuart G Porter.

and in subsequent generations to disappear phenotypically but not genotypically ('genetic composition'). In large natural populations, the expression of a single recessive allele in combination with a dominant counter allele will not be expressed in the phenotype and the carrier of the colour variation appears to be the common colour variation (so-called 'splits'). An example of this occurs in humans where two people with brown eyes (brown colour being dominant) can have blue-eyed children if both parents carry the blue eye allele as well as brown.

The exponential increase in human populations and concomitant habitat destruction forced wild animals into ever diminishing land areas; it also forced wild herbivore populations to become smaller. With the development of game ranching and the greater concentration of animals, the possibility of observation and identification of colour variants increased significantly. By a process of breeding with these animals there was an increase in the numbers. Even today, in terms of the total population numbers of a species, the number of colour variants is relatively limited.

Aside from the common springbuck, there are three springbuck colour variant trophies that have become popular to collect and collectively officially recognised as the 'Springbuck Grand Slam' – they are black, white and copper springbuck.
 Photos courtesy Jules of the Karoo Safaris.
 Photos © Willem van Rooyen.



Common springbuck



Black springbuck



White springbuck



Copper Springbuck



Copper springbuck (*Antidorcas marsupialis*).
 Photo courtesy Jules of the Karoo Safaris.
 Photos © Willem van Rooyen.



Black impala (*Aepyceros melampus*).
 Photo courtesy Castle de Wildt.



Saddleback impala (*Aepyceros melampus*).
 Photo courtesy Leopard Rock Game Breeders. Photo © Quintus Strauss.

GAME BREEDING

South African game ranchers have been accused of *genetically manipulating* game animal populations to the detriment of the species concerned and posing a threat to biodiversity. Genetic manipulation and modification refers to techniques where the genetic composition of an organism is modified to the extent where a new organism is created that was not the result of normal, natural mutation. The techniques include, among others, the transfer of genetic material from one organism to another (even unrelated) through the splicing of donor genetic material to the DNA of the recipient. The 'new' creation did not previously exist. These techniques are high-tech laboratory procedures, not within the realm of expertise of a game rancher.

What game ranchers do is choose individuals from the natural population and use these animals in breeding. This approach is called *selective breeding*. Selective breeding has been employed in animal husbandry by man for thousands of years. This technique also forms the basis of the natural evolutionary process where nature (the habitat) performs the selection of the 'fittest' individuals. In

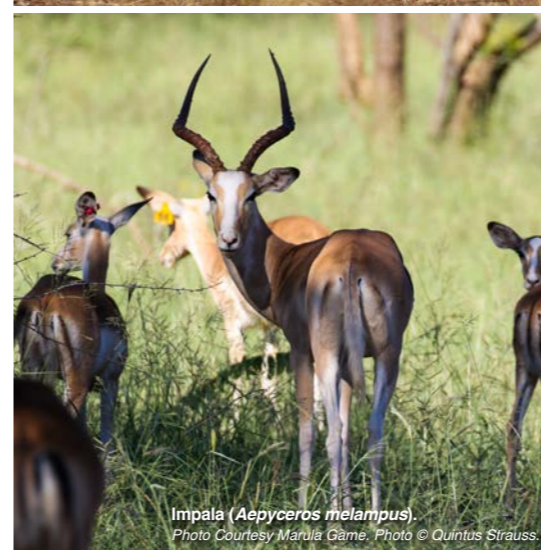
Selective breeding has been employed in animal husbandry by man for thousands of years.

the case of selective breeding, man defines 'fit' within the constraints of the habitat. Whether the selection is for body size, horn length, coat colour and so on, the same rules for survivability apply to the desired selection within the constraints of habitat.

In the breeding of colour variants, the same principle applies: naturally occurring colour variants (natural mutations) are selected and bred. However, in cases where more than one colour mutation has occurred in a species, the interbreeding of the different colour variants is highly debatable and should be approached with circumspection.



White-flanked impala (*Aepyceros melampus*).
 Photo courtesy Leopard Rock Game Breeders.
 Photo © Quintus Strauss.



Impala (*Aepyceros melampus*).
 Photo Courtesy Marula Game. Photo © Quintus Strauss.

CONTRIBUTION OF GAME RANCHING TO SOUTH AFRICAN WILDLIFE AND CONSERVATION

- Increased game numbers, both common and scarce species and managing these populations on a sustainable basis.
- Increased land area available to game animals. Beginning in the 1970s, the land area available to indigenous game populations increased about tenfold to 20 million hectares at present (three times the area covered by municipal, provincial and national parks together). This significantly augments the national and provincial game areas. *This private sector initiative was developed and maintained at no cost to the taxpayer.* This resulted in a huge contribution to the promotion of biodiversity. Marginal and even degraded former cattle ranches and crop farms with a largely exotic mono-species composition converted to game ranches with an indigenous multi-species composition.
- As a spin-off from game ranching, the industry contributed hugely to conservation of game species and limitation of habitat loss, not only to those selected or ranched species but to many others such as insects (dung beetles, butterflies), reptiles (monitor lizards, tortoises), birds (oxpeckers) and especially the smaller carnivores and scavengers.
- The South African game ranchers and game breeders are unique in the world. They have in the past four decades managed to acquire the knowledge, skills and techniques to successfully breed and manage mixed game populations on a sustainable basis. Has the industry made mistakes? It is almost inevitable in the development of a new industry, moving into uncharted territory, that mistakes can occur; however, with combined input from all role players, these can be mitigated. In this context, it is important to employ facts and not emotions.
- In the 1960s and 1970s, when the game population was rapidly diminishing, the 'armchair conservationists', including the 'greens' and the 'anti-lobby' (anti-hunt, anti-guns, anti-specialised-breeding) made no significant contribution to reverse the trend. Their often vocal and emotional viewpoints, not backed by facts or financial contributions, grew in direct proportion to the development and growth of the game ranching industry.

BREEDING COLOUR VARIANTS

There are probably a number of reasons why game ranchers breed natural colour variants.

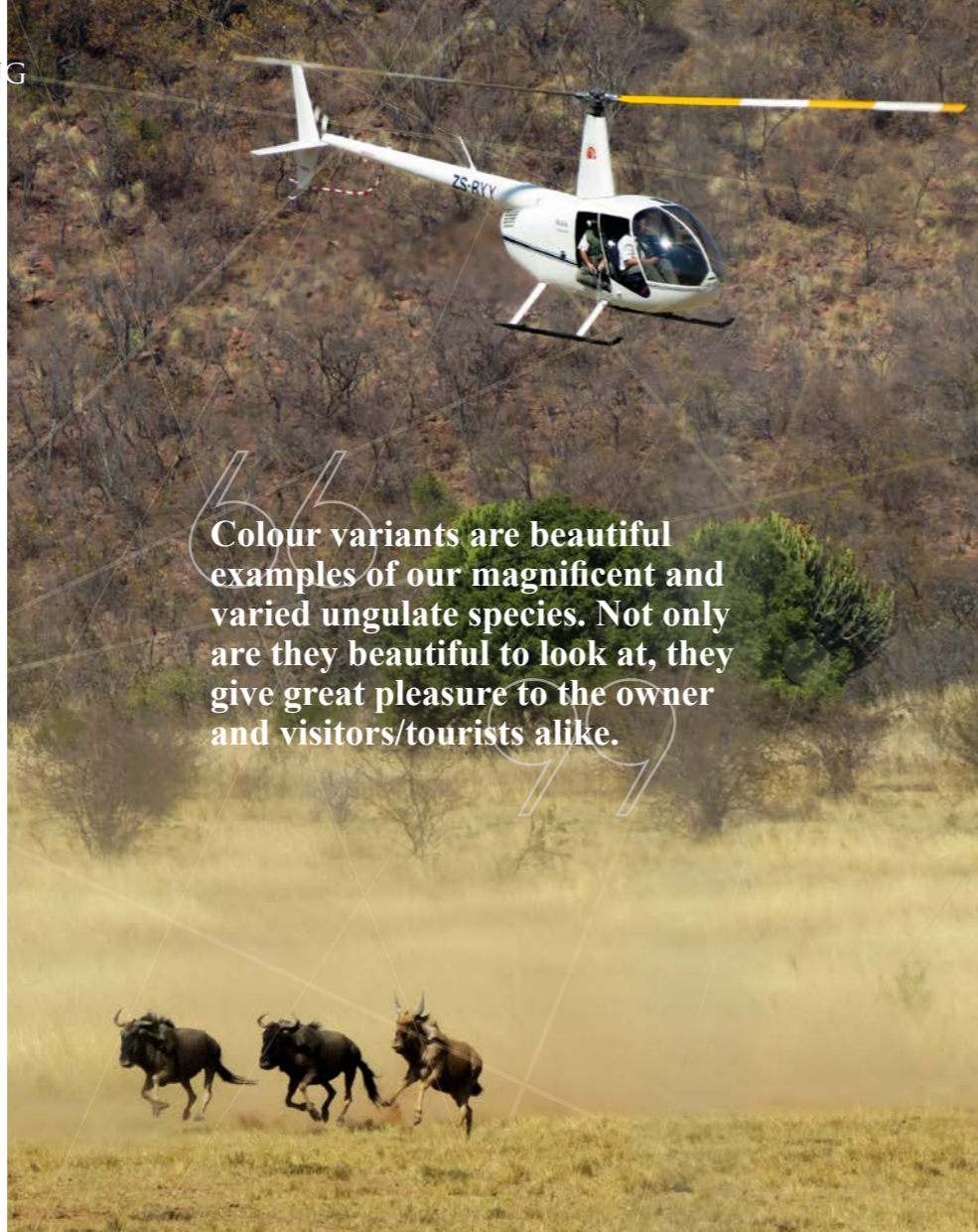
1 Genetic conservation

The large number of colour variants in the natural ungulate populations gives some indication of the genetic diversity that exists in natural populations. Often, when genetic expression is achieved only in the double recessive configuration, such individuals are in the minority in the natural population since their phenotypical expression is prevented by the single dominant allele. The fact that some animals are carriers of the recessive colour variant allele, with no or very little outward indication, has led to the belief that very few animals in the natural population carry the genetics for the colour variation. With the relatively recent advent of game ranching, ranchers could selectively breed these carrier animals and to the surprise of many people colour variants sprang into existence. Amongst the general public and even some 'game experts', these 'new' animals were regarded as so-called 'manmade' animals.

It can be argued that the opposite of the above perception is more relevant: *natural colour variants in ungulate populations are an indication of natural genetic diversity.* Responsible conservation demands that this diversity should be protected. This implies careful selection and propagation of the pure natural genetic mutation. It does not imply the cross-breeding of different strains of colour variants in the same species as a standard ranching practice. Guard against the breeding of 'Smarties' where all kinds of unnatural progeny are the result. This type of animal does not deserve conservation status.

2 Aesthetics

Colour variants are beautiful examples of our magnificent and varied ungulate species. Not only



Colour variants are beautiful examples of our magnificent and varied ungulate species. Not only are they beautiful to look at, they give great pleasure to the owner and visitors/tourists alike.

are they beautiful to look at, they give great pleasure to the owner and visitors/tourists alike.

3 Economics

Commercial game ranching is in the first place an agri-business. Like any business enterprise, it must be efficient and profitable. This has resulted in a perception that game ranchers 'just want to make money'. A game ranch must be profitable to survive. Conservation, which is not always the primary aim of game ranching but often an important spin-off, is expensive; likewise, game ranching is expensive. Without a positive cashflow, game ranching cannot fulfil the crucial role it plays in the overall protection and promotion

of our national heritage. The selective breeding and trade in colour variants helps to achieve this aim.

4 Habitat protection and reclamation

The surest way to destroy a species is to destroy the habitat. The uncontrolled increase in human populations is one of the foremost agents in habitat destruction. To feed the human population, thousands of hectares of land have been set aside for crop farming. To house the ever-increasing population, ever-spreading urbanisation has led to large areas of former natural habitat being totally destroyed. In stock farming, the monoculture of domestic animals has led in some instances

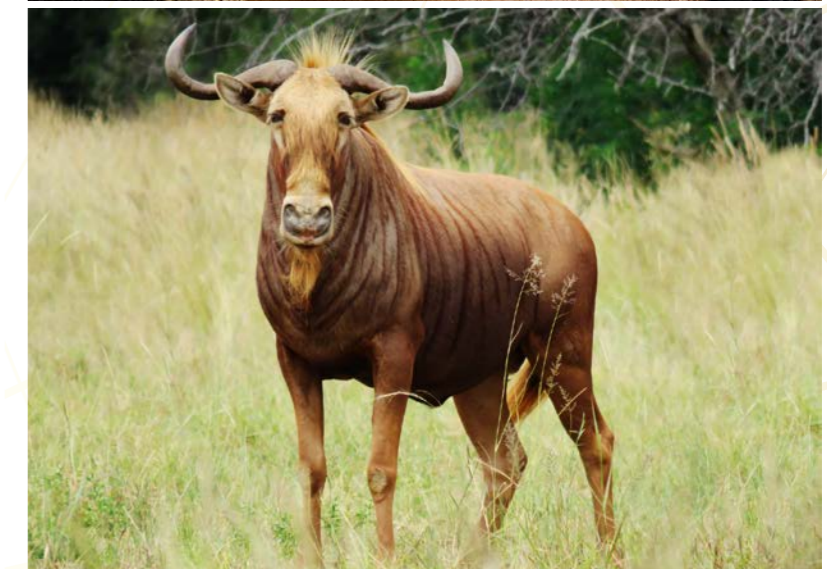
to habitat degradation. It can be concluded that human actions have led to diminishing biodiversity and even destruction of biodiversity. By contrast, game ranching has in many instances improved habitat on former cattle ranches and even on former marginal crop farms, through control of soil erosion, selective invasive bush control, and improved distribution of watering points and removal of internal fences. This and other measures like the regulation of stocking density and a multi-species herbivore population have led to habitat improvement with enhancement of biodiversity as a bonus.

CONCLUSIONS

Game ranching is an agri-business and must be run on sound economic principals. In spite of this, or because of this, this industry has made a *huge contribution to the conservation of most game species*, especially in the past two decades. In this process, a significant contribution was made to the protection and enhancement of biodiversity.

It is very clear that natural colour variants in ungulate populations are not 'manmade' and rather indicate the natural genetic diversity in many game species. It can be argued that the protection and breeding of natural colour variants should also be seen as a conservation action in the protection of genetic diversity of our natural ungulate species. In this process, the crossbreeding of colour variants in a species should be approached with utter circumspection. We should refrain from breeding 'Smarties'.

In the development of game ranching, it is possible that mistakes will be made. To mitigate these effects, it is important that role players should work closely together through their organisations. Breeders, hunters and scientific institutions can all make an important contribution in this regard.



Barry York, one of the founder breeders of the golden wildebeest or golden gnu (*Connochaetes*), and his family have been devoted to the conservation of this unique, rare gem of nature since their first identification on the farm Swinburne (Limpopo River Basin) in 1985. Having started a breeding, selection and management programme based on scientific principles in 1990, the York golden wildebeest have strong genetic diversity, good colouring and impressive trophy quality, from a variety of unrelated animals.

Photos courtesy York Golden Wildebeest, a member of Golden Breeders.



For more information, contact Erich Graupner: slamsystems@wol.co.za