

SA buffalo genetically sound

Dr Ben Greyling, research team manager at the Agricultural Research Council's beef improvement scheme, says that buffalo herds on game ranches are in a healthy genetic state, despite concerns to the contrary. Gerhard Uys reports.

It is estimated that the number of Cape buffalo on commercial wildlife ranches in South Africa has increased to over 60 000, which is approximately double that found in conservancies or protected areas.

According to Dr Ben Greyling, research team manager at the Agricultural Research Council's (ARC) beef improvement scheme, the sustainable utilisation and future protection of buffalo call for effective conservation and management strategies. DNA technology, in particular, had become an indispensable tool, he said.

"Most of what we know and have learnt about wildlife species stems from conservancy-based populations and wildlife conservation programmes [that were] primarily designed to maintain biodiversity at ecosystem level and genetic variation at species level," he said.

DNA TECHNOLOGY

Molecular genetics studies undertaken by the ARC and its collaborators showed that the Kruger National Park (KNP) population was genetically healthy. Herds within KNP were genetically not significantly different, even over distances of up to 300km. This was indicative of a good level of gene-flow taking place between the herds and sub-populations within KNP. There was also a very high rate of male dispersal, which contributed to the high level of gene-flow among the herds and sub-populations. Females have also been shown to contribute to gene-flow through their own dispersal.

Data about the extent of dispersal and migration were vital to determine the

number of translocations needed to keep historical migration patterns intact, and supplement genetic variation – one of the key indicators of a population's genetic health.

In another more recent study by Greyling on the KNP population, it emerged that during the dry season, certain male buffalo produced more female offspring, while during the wet season some mainly produced male offspring. This phenomenon has been attributed to genes on the Y chromosome interacting with one another in response to environmental factors, resulting in this gender ratio distortion. It was found that both the environment and the body condition of these males acted as 'triggers' for these genes.

ENVIRONMENTAL FACTORS CAN DISTORT GENDER RATIOS

"To ensure genetic variation, managing the genetics on buffalo ranches is important. Research has shown that fragmented and small populations are prone to genetic drift, resulting in a decreased level of genetic variation and potential loss of fitness," Greyling said.

The latter could negatively affect fecundity, survival, growth and susceptibility to environmental stress. Inbreeding was also a prominent threat encountered in small populations, and record-keeping, especially data with regard to pedigree, had become an essential tool to prevent close relatives mating.

Until recently, no baseline information was available to



ABOVE: Effective conservation and management of buffalo are necessary for the sustainable utilisation of the species. FW ARCHIVE

quantify the genetic status of buffalo on ranches. Another study conducted by Greyling, in which buffalo from about 30 wildlife ranches were analysed with DNA markers to assess the genetic status, using KNP and Hluhluwe-Imfolozi Park (HiP) populations as benchmarks, indicated that there was a small but significant genetic differentiation between male and female buffalo from the same ranch, suggesting that female buffalo were derived from a more diverse stock than male buffalo. It also suggested that ranches made use of a relatively small number of breeding bulls.

This study further showed that males and females were relatively unrelated and there was relatively little movement of buffalo between ranches, resulting in relatively large genetic differences. "The genetic diversity of all ranches combined was comparable to that of KNP," Greyling said.

A few ranches had lower levels of diversity compared with KNP, while by far the most had diversities higher than HiP. No inbreeding due to incestuous matings could be demonstrated, and the lower levels of genetic variation on some ranches could be attributed to the small number of animals present.