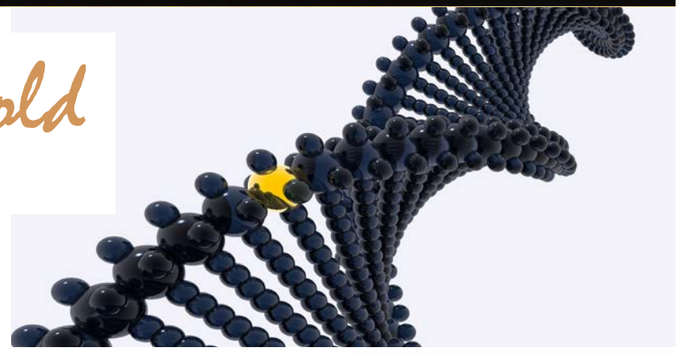
THE WELL-KNOWN BUFFALO BULL, HORISON – WITH A HORN SPREAD OF 55". THE OWNER, PIETER LAMPRECHT, WILDLIFE RANCHER OF THE YEAR 2014, IS PART OF CROWN GAME BREEDERS AND BLOODLINE AFRICA. THEY OFFER SOME OF THE BEST GENETICS AVAILABLE IN SOUTH AFRICA. THIS, COMBINED WITH SCIENTIFICALLY FORMULATED FEEDING, PRECISE RECORD KEEPING AND EXTENSIVE EXPERIENCE IN GAME BREEDING, SUPPORTS GENETIC DIVERSITY.

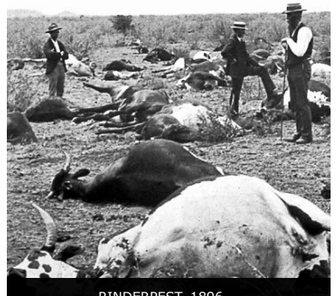
BLACK *Gold*

by Fiona Zerbst in conversation with Prof Pim van Hooft



The buffalo ranching industry has never had it quite so good – business is booming and animals are reaching record prices at auctions. But there have been rumblings of concern in the industry as ranches have wondered whether their populations are genetically diverse enough to sustain future generations.

The rinderpest epidemic in the 1800s dramatically reduced buffalo numbers and more than 80-90% of the animals succumbed to the disease. British veterinary researcher Walter Plowright has suggested that rinderpest was introduced into Africa, probably by the importation of zebu cattle from India for the Italian armies in 1889. It spread rapidly through the continent, only to be temporarily stopped by the Zambezi River in 1893. In 1896, it jumped the river, reaching the Cape in 1897.



RINDERPEST, 1896.

THE BUFFALO BULL, MYSTERY, WAS SOLD FOR R40 MILLION TO DR JOHANN RUPERT. THIS WAS A RECORD PRICE FOR A BUFFALO – WITH A HORN SPREAD OF 53", AT THE ANNUAL THABA THOLO AUCTION NEAR THABAZIMBI IN SEPTEMBER 2013.

PROF PIM VAN HOOFT AT THE 2015 WRSA CONFERENCE HOSTED AT SUN CITY IN MARCH 2015.

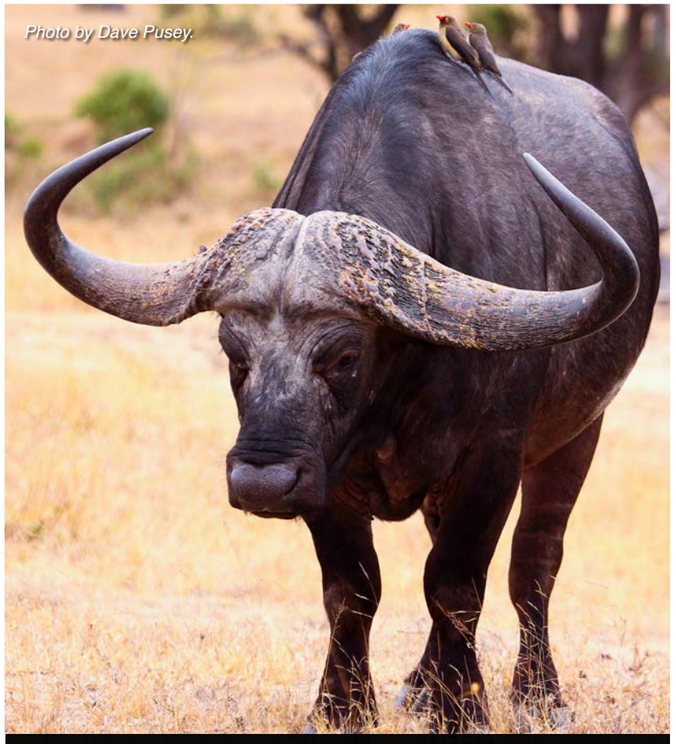
There are only about 112 000 Cape buffalo (*Syncerus caffer*) in southern Africa and most populations are confined to designated conservancies – many are found on private wildlife ranches. Ranchers have been anxious to know whether they have enough genetic diversity in their herds or if their animals are inbred, which may cause a general loss of fitness in their animals (known as 'inbreeding depression'). It was therefore deemed important by WRSA for Pim to analyse existing genetic data at laboratories in South Africa (Veterinary Genetics Laboratory, Unistel and the ARC) and present his preliminary findings at the 2015 WRSA conference held recently at Sun City.

Pim's postdoctoral studies at the University of Pretoria focused on the population genetic studies of lions and African buffalo in the Kruger National Park (KNP), so he was already well versed in the

There were fears that the rinderpest created a 'bottleneck effect', reducing genetic variation among populations (this would have potentially limited the buffalo populations' ability to adapt to future environment and disease challenges). However, the bottleneck did not result in a measurable decrease of genetic diversity, according to Professor Pim van Hooft, associate professor at Wageningen University in the Netherlands. "This was probably because 10-20% of 1 000s of buffalo per population is still quite a lot of buffalo," he says. "Moreover, most populations were able to recover within three generations – that is, in about 20 years."

ORION BUILDING AT THE WAGENINGEN UNIVERSITY CAMPUS IN WAGENINGEN.

CROUSBROERS' BUFFALO. ACKNOWLEDGED AS 2014 *WRSA WILDLIFE RANCHER OF THE YEAR: WINNER: BREEDER OF THE YEAR*, DIE CROUSBROERS, RIAAN, KOBUS, AND DAVID CROUS, HAVE BEEN FARMING SINCE 1995 WITH THEIR DAD, VILJEE, IN THE KROONSTAD, STEYNRUS AND THABAZIMBI AREA.



CAPE BUFFALO IN KRUGER NATIONAL PARK.

subject, making him the right man for the job; his task was to determine genetic differentiation within populations and the exchange of genetic material by translocation or natural dispersal among populations, as well as assess inbreeding and levels of genetic variation.

"I compared the genetic diversity on ranches with wild populations in KNP, Hluhluwe-iMfolozi, Addo and St Lucia," Pim told *Wildlife Ranching*. "Ranchers from 26 ranches sent me their DNA data from 2 387 animals in total." Four ranches had to be excluded from the statistical analyses as these ranches sent few samples for analysis and calculating genetic diversity between these few animals will produce an inaccurate picture of the diversity.

The good news for ranchers is that diversity is higher than originally anticipated. Firstly, Pim found that when buffalo from

CAPE BUFFALO IN HLUHLUWE–IMFOLOZI.

the 22 participating ranches are pooled, the genetic diversity is greater than that of the KNP (see Figure 1). This is an important finding, as the number of privately owned animals tested was 10 times lower than the buffalo in KNP (30 000), but the genetic diversity is still higher. When investigating the ranches individually, Pim found that most ranches have less genetic diversity than KNP, but more than that of Hluhluwe-iMfolozi (HiP).

Only four ranches have less diversity than HiP (which has 85% of the diversity of Kruger, largely because its founder population was much smaller). All ranches show greater genetic diversity than Addo and St Lucia, where the diversity is 65% compared to KNP (they have the smallest populations). One ranch showed genetic variation greater than that in KNP, even exceeding the pooled buffalo group, indicating

CAPE BUFFALO IN ADDO ELEPHANT PARK.

CAPE BUFFALO IN ST. LUCIA. PHOTO BY http://www.africanwildside.com

BUFFALO AT THABA THOLO, 2014. GENETIC DIVERSITY IS SAFEGUARDED AND ENHANCED BY ACCOMMODATING LARGE YET SUSTAINABLE NUMBERS OF EACH SPECIES. "THE VERY POSITIVE RESEARCH FINDINGS SHOULD ENCOURAGE WILDLIFE RANCHERS TO CONTINUE TO INVEST IN SOUTH AFRICA'S 'BLACK GOLD'." – PROF PIM VAN HOOFT

outbreeding on this particular farm. Pim theorises that the moderate to high levels of genetic variation found could be attributed to the fact that the baseline level of genetic diversity is relatively high, suggesting the original breeding populations were largely unaffected by the rinderpest pandemic. "At least 400 animals must have survived the great rinderpest pandemic in KNP to explain the current levels of genetic diversity," Pim says. "It's possible that the 'bottleneck effect' could have been over-estimated – and likely that the remaining animals had quite high levels of genetic variation."

More good news suggests an absence of inbreeding.

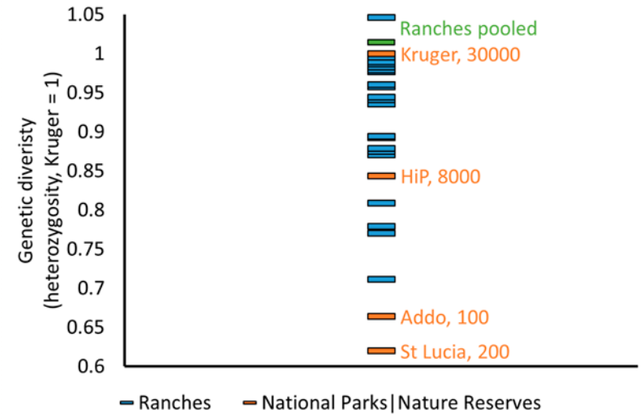
"There are two possible reasons for low genetic diversity," van Hooft told *Wildlife Ranching*. "Mating between relatives like brother and sister (incestuous mating), or small herd sizes. My findings indicate that small herd size is most likely responsible for the four ranches with lower diversity. It also appears that males and females are relatively unrelated as they come from different sources – an indication of outbreeding. There is a significant genetic difference between males and females."

Research also shows that buffalo on ranches are most closely related to KNP buffalo.

Pim will be announcing his recommendations shortly in an official report; however, for now, he believes that buffalo should be moved around farms to increase diversity and prevent inbreeding in the future. "Genetic diversity per individual ranch can be increased by translocating animals, normal practice already on some ranches – one migrant per generation (seven years) is enough to limit decrease to a maximum of 20%," he says. "Ranchers should continue to monitor their populations. I also recommend not moving animals around between wild populations."

His findings are very positive and should allay ranchers' fears about a lack of genetic diversity. The data clearly indicates that the genetic diversity of privately owned buffalo is larger than that of the national parks in SA – scientific evidence to address the possible concerns about inbreeding by wildlife ranchers. This should encourage them to continue to invest in South Africa's 'black gold'.

FIGURE 1: Comparing the genetic diversity of privately owned buffalo with that in the national parks in SA. Orange = the national parks (KNP, HiP, Addo and St Lucia, respectively), blue = individual buffalo ranches, green = pooled data from private ranches.



PRELIMINARY RESEARCH FINDINGS

- There is no reduction in genetic diversity as a whole on ranches.
- There is low genetic diversity (< HiP) in only four out of 22 ranches, due to the small number of individuals on those ranches.
- There are relatively large genetic differences among ranches, indicating little movement of buffalo between ranches.
- Males are relatively closely related with (partly) different origins from females.
- There is no evidence of inbreeding due to incestuous matings.