



SCIENCE

to the

Rescue

- Dr Morné de la Rey

Assisted Reproduction in cattle has become the way forward in breeding faster and quicker high-quality genetics. It is also the "new" way of moving genetics around the world without spreading diseases.

It was an honour and a privilege to accompany President Ramaphosa to Uganda where we visited President Museveni's cattle farm. This visit had been preceded by Mr Ramaphosa's agreement with President Museveni to acquire 43 Ankole cattle from his most beautiful herd. We spent a few days at President Museveni's farm where we selected good quality and highly fertile beefy Ankole cattle.

We took forty Ankole cows and heifers, including three bulls, to Embryo Plus' embryo and AI research station at Ol Pejeta Conservancy, near Nanyuki in Kenya. While we could now technically get around the concerns of disease the Department of Agriculture had by using Dr Morné de la Rey's embryo transfer methods, the Registrar of Stock Improvement also did not approve of



Mr Ramphosa selecting cattle at Pres Museveni in 2003

our importing a new breed into South Africa. We were convinced, however, that Ankole would be of great benefit to the cattle industry. In the USA, some trials were done on Ankole-Watusi cattle which were crossed with different breeds that showed lower cholesterol content (higher Omega 3, 6 and 9) in their fat and muscle, which is highly beneficial for heart disease. Similar studies were being conducted in Uganda. I put this information together in a report to the Registrar with our request to import embryos for trial purposes. The Registrar did eventually approve the importation of the Ankole, but wanted a full-scale trial. We were required to provide information, such as, birth weight, weight of the cattle at 12 and 18 months; weight and age at first calving, inter-calving-period; fertility, semen quality of the bulls; and disease and drought resistance. I was quite sure these would all come out positively.

The cattle were tested for various diseases in Uganda and thereafter transported to Embryo Plus' embryo and AI research station. This facility is also a registered export centre, so the embryos could be exported to South Africa easily. Sadly, two cows died in transit due to exhaustion from the 3 day long trip through the border and the Great Rift Valley. We were very sad about that, but were impressed with how well all the others did overall. The cows and bulls underwent vigorous disease testing for a battery of diseases and were then placed into pre-quarantine for 6 months before going into quarantine.

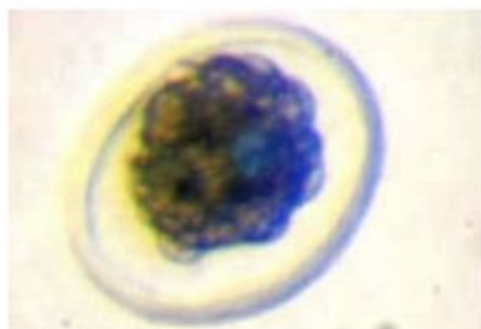
It's worth having a brief, cursory knowledge of the science behind embryo transfer as it is a fascinating prospect for cattle farming. Worldwide, it has been recognised as the fastest and most economical method for genetic multiplication — to increase the impact of the outstanding animals in your herd. With embryo transfer, breeders are able to

produce more offspring from those cows that have been proven to be good for breeding — plus it can shorten the interval between genetic progress when flushing a heifer with great genetic potential. In other words, the breeder can increase valuable genetic lines through the use of embryo transfer. Embryo Plus Embryo and AI Centre is world-renowned and known to have introduced Boran to South Africa and Bonsmara to the rest of the world along with imports and exports of a vast range of genetics through semen and embryos.

There are four steps in the process: (1) Superovulation. (2) Artificial Insemination. (3) Embryo Flushing and (4) Embryo Transfer. Superovulation is when a specific hormone treatment is given to the cow to cause multiple follicles to ovulate. It's very important that the cow is treated in the correct manner during this part of the process, as it will determine how successful the embryo transfer will be. She must be kept in a comfortable, stress-free environment and cared for properly.

It is then time for insemination. The cow is inseminated with semen from the bull. One bull may be used or, in fact, multiple bulls. This allows for breeders to choose semen from their best bull and produce multiple pregnancies. The best genes, therefore, can come together.

The fertilised ova then develop into embryos, which are flushed from the cow seven days after insemination (this is the flushing and transfer part of the process). However, as you will soon see, it was somewhat different with the Ankole. This flushing process of the uterus is non-surgically done with a 3-way catheter and nutritious media. The embryos are then examined and either transferred to a recipient cow or frozen and stored in liquid nitrogen for later transfer into a recipient cow. The recipient cows must also be treated well for the success of the programme. They must be managed carefully to ensure as many pregnancies as possible.



First ever embryo flushed

When the cows arrived in Kenya, eighteen were not pregnant, so we placed them in a flushing programme. We used the biggest bull, BA1, for the semen collection - a beautiful brown creature with a white and brown spotted head, and magnificent horns curving slightly upwards at the top. We flushed the first embryos on 24 October, 2004 and eagerly awaited the results.

However, it was a huge disaster. We were hoping to flush at least four embryos per cow, but only received an average of less than one per cow! We were tremendously disappointed. I, for my part, did not expect this, as I usually have such great success. But Mr Ramaphosa still believed in the project and knew I could do it.

"I got the best person to do the job," Mr Ramaphosa said to me. "I'm sure you'll find a way to do better. Just hang in there." That gave me a lot of confidence that Mr Ramaphosa stayed positive and wanted us to push through.

I believed there were five possible causes. The Ankole cows might not have eaten the concentrates as well as other cattle and didn't pick up enough weight. Or they went on heat 24 hours later than other cattle. It also seemed that perhaps they did not react to the hormones very well, and the embryos grew twelve hours slower than most other breeds. In addition to this, it was possible that the bull's semen was sub-standard. So I set to work on solutions to these problems. For the next round, we used our younger bull's semen, postponed the artificial insemination by twelve hours, increased the concentrates, changed the programmes, and doubled the usual amount of follicle stimulating hormone, flushing the embryos twelve hours later than usual.

This time, almost in time for Christmas (December, 2004) we got forty-nine embryos from the same eighteen cows! That was three times more embryos! I immediately took to fine-tuning the process, and we began to average between six to ten embryos per flushing. Overall, we got 962 embryos - 4.9 embryos per flush which is incredibly good for *Bos indicus* or African cattle. (Even some bulls born and raised at the OI Pejeta facility have been used later for a variety of genetics.)

We also needed to prove the quality of the beef and we decided to slaughter one of the cows. We sent the meat to the University of Pretoria for testing. Here is where Professor Edward Webb came into the picture. He was very pleased to do the testing and found the meat to possess 50 percent more poly-unsaturated fatty acids than other meats.

This implied, as we thought (and has been shown in the U.S. and Uganda), Ankole meat has lower cholesterol than other red meat. However, because the samples were frozen for transportation, it was not possible to do actual cholesterol testing. We were not sure if the cholesterol levels reported in Uganda and elsewhere were due to genetics or diet. Later on, it would show that we were correct - and that it is due to genetics. Sean-Luc de la Rey did a scientific trial to test various breeds and Ankole on the same nutrition for poly-unsaturated fatty acids-PUFA's (like Omega-3 and Omega-6). With this trial and results he won the animal science section on the National Science Expo. It also turned out that the meat is specifically high in omega-3 fatty acids. It has a low fat content, especially when compared with other beef carcasses, and much like other game meat. This along with the extensive adaptability of the Ankole, we believe, will have positive implications in terms of growing consumer demand for trim and low fat content, organic, free-range meat.

Furthermore, Ankole milk has a butterfat content of ten percent. In the Great Lakes Region, Ankole are actually kept mainly for milk production.

The 4th of May, 2005 was a big day for us!!! The embryos finally landed in South Africa, they were cleared from the Johannesburg quarantine centre, and the first-ever Ankole embryo was transferred on the 3rd of July in the Embryo Plus quarantine centre in Brits. In February the next year, our first Ankole calf was born on South African soil! I could not contain my excitement. The project was a resounding success! Since then, many Ankole calves have been born and we have a wonderful growing herd of Ankole cattle.



Mr Ramaphosa & Dr de la Rey