

CHALLENGES FACING THE IMPLEMENTATION OF DEOXYRIBONUCLEIC ACID TECHNOLOGY IN COMBATING STOCK THEFT IN KWAZULU-NATAL PROVINCE, SOUTH AFRICA

Witness Maluleke

University of Limpopo (UL), South Africa

Email: witness.maluleke@ul.ac.za

Jacob Tseko Mofokeng

Tshwane University of Technology (TUT), South Africa

Email: mofokengjt@tut.ac.za

-Abstract-

Existing studies on stock theft mainly focus on combating theft using conventional methods such as brand-marking and tattooing, with the emphasis being placed on the current legislative frameworks of South Africa's Stock Theft Act (No. 57 of 1959) and the Animal Identification Act (No. 6 of 2002). Limited studies have been done to explore the challenges facing the implementation of Deoxyribonucleic Acid (DNA) technology in combating stock theft in KwaZulu-Natal (KZN) and other provinces. In a generic qualitative study based on Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) with 22 participants, this study found that DNA technology is not effectively being used to combat stock theft in the province, while the use of the new Criminal Law (Forensic Procedures) Amendment Act (No. 37 of 2013) (the "DNA Act") might yet prove an effective remedy for combating this scourge. This study recommends that knowledge of DNA technology in combating stock theft in the province should be interpreted, disseminated and implemented correctly by the relevant stakeholders, if the country seeks to effectively address the current challenges associated with stock theft.

Key Words: DNA technology, KwaZulu-Natal, South Africa, stock theft

JEL Classification: Q55

INTRODUCTION

According to the television programme *Leihlo La Sechaba* of South African Broadcasting Corporation [SABC] 2 (2017:np), the Animal Genetics Division of Animal Research Council (AGD ARC) has hired many bright young scientists to help police investigations into stock theft in South Africa. Shoni Zwane [junior researcher, AGD of ARC] (S.a) (in SABC 2, 2017:np) confirms that stock theft is prevalent in this country: In 2016, they analysed about 500 cases. She explained that although individual stock thieves continue to steal livestock (i.e. cattle), her organisation is helping to combat this crime using DNA technology. Zwane (S.a) (in SABC 2, 2017:np) warns: “If criminals (stock thieves) think that nothing can be done with stock theft cases, they must know that we use DNA and it cannot be forged, each individual (i.e. animal and human) consists of unique DNA, therefore we use it to trace the lineage of stolen livestock, to be able to arrest the responsible criminals.”

These scientists are able to trace the origins of livestock, such as cows, using DNA. As Zwane explains [S.a] (in SABC 2, 2017:np): “If a criminal steal[s] and slaughter[s] a cow, the police will go to the crime scene to bring samples and if, during the act, a suspect had blood on their clothes or they find meat in their fridge or cooked, they [the police] just have to bring the meat to our laboratory.”

Stock theft has broader implications than the mere loss of animals - it also affects food security. Through the use of DNA microsatellite marker technology, the AGD of ARC has managed to resolve the problem of establishing the identity of lost or slaughtered livestock, livestock paternity in ownership dispute cases, and uncertainty regarding the origins of meat products. Although some cases remain unsolved, those that are reported and investigated have led to an

increase in the conviction rate of stock thieves. To this end, DNA technology can be used as an important forensic instrument to combat stock theft, and related testing is an increasingly vital method employed by the Criminal Justice System (CJS), used to determine identity, ownership, traceability and the species origin of animal products such as tissue, blood and skin. Apart from identical twins or clones, no two animals are genetically the same. This means that the DNA of an animal is a 'fingerprint' or unique means of identification. Only small quantities of DNA are needed to confirm the 'fingerprint' of an animal.

However, 'how does DNA technology help to combat stock theft?' Hair samples (a source of DNA) are collected from individual animals and stored in the AGD of ARC laboratory as reference samples. When animals are injured or have sloughed at a crime scene, or a piece of meat from a stolen animal is found in the possession of a suspect, a tissue sample is taken and compared to the reference sample in the laboratory. If the DNA 'fingerprint' of the reference sample agrees with a sample from the crime scene, the suspect can be connected to the crime scene or the crime itself, and the evidence can be used to put the offender behind bars. Even if no reference sample is available, conviction is still possible if DNA from the blood, bloodstains, meat or other tissues found at the crime scene compares with blood found on the suspect's clothing, the tools that were used, or meat found in his/her possession. Importantly, the success of forensic DNA services is dependent on all parties involved correctly collecting samples at a crime scene, processing and analysing them in the laboratory, and reporting the findings. To ensure adherence to the chain of custody, the AGD of ARC provides continuous training to South African Police Service (SAPS) personnel, several times per annum. Such training focuses on DNA sample collection, storage, and dispatch to the laboratory (National Stock Theft Prevention Forum [NSTPF], 2016:34-35).

The benefit of the training is demonstrated by the quality of the DNA samples the SAPS members bring to the laboratory for testing. The AGD of ARC started working with resource-poor farmers in Limpopo

in 2005, to introduce the Livestock Identification Catalogue (LIDCAT) to control stock theft. The project concentrated on hotspot areas, which included Polokwane, Giyani, Marble Hall and Zebediela. Additional equipment for ear-tagging, brand-marking and handling of animals was purchased, while the record-keeping process was streamlined. The LIDCAT team also designed and presented tailor-made information sessions to inform rural farmers of the details of the project (NSTPF, 2016:35).

The next sections advance the objective of this article, which is to explore the challenges facing the implementation of DNA technology in combating stock theft in selected areas of KwaZulu-Natal (KZN).

METHODOLOGY

The population for this study consisted of 22 participants serving in Anti-Stock Theft Structures of KZN Province - two (02) from the Department of Agriculture, Forestry and Fisheries' (DAFF) – From Animal Production Section; one (01) from the SAPS Stock Theft Unit (STU) – the Coordinator, Durban Central, who participated in the KIIs; 14 SAPS STU officials who took part in FGDs, amongst whom 12 were from Ladysmith and one (01) each from Utrecht and Pietermaritzburg; and finally five (05) participants from Anti-Stock Theft Associations. Their opinions were explored on the challenges of implementing DNA technology to combat stock theft in selected areas of KZN. This study, which was descriptive and exploratory in nature, was accomplished by through FGDs and KIIs. With the majority of study participants hailing from KZN, non-probability sampling was used, whereby a purposive sample was selected (based on participants' experience and knowledge of the subject matter), from which participants in the FGDs and KIIs were chosen haphazardly. The selected participants were Africans – Twenty (20) and two (02) White people, while some were fluent in *IsiZulu* and English, in consequence, other languages spoken in KZN were also represented. The data obtained from the selected participants in response to the drafted *Interview Schedule Guide* was organised, outlining questions related to the subject under study, while ensuring that the elicited data

met the original study objective and aligned with the problem statement. The collected data was read several times to grasp the perspectives of the participants, also having taken down cryptic written notes of statements made during the FGDs and KIIs.

PRELIMINARY LITERATURE STUDY

The NSTPF (2016:35) reports that the SAPS and the AGD of ARC-Animal Production Institute (AGL ARC-API) in Irene had entered into a partnership in 1996, to combat stock theft with the aid of DNA technology as previously stated in this study. According to the SAPS, numerous court cases have since been successfully concluded thanks to the use of DNA evidence and analyses. Using more than 3 000 pieces of evidence, approximately 95% of cases have been solved and the suspects prosecuted. In addition, in 2007 close to 3 000 animals from 270 farmers were entered in the LIDCAT system. A very encouraging fact is that, in certain areas (according to official SAPS statistics) stock theft has declined dramatically subsequent to related field excursions – a further indication that the LIDCAT system acts as a deterrent against theft, thus saving the farmers a great deal of money. Given these successes, the vision of the LIDCAT team is to transform the project into a national initiative and in so doing to contribute to the competitiveness of the developing livestock sector (but more on this later).

In another report, Greyling (2006:13, 15) points out that “they say that the easiest way to make money is to stop losing it. Because of stock theft, farmers lose a lot of money every year. Stock theft hurts all farmers, whether you are a commercial, stud or small-scale farmer. Stock theft is very bad for small-scale farmers who have only a few animals. They do not always have the money to buy new ones.” One of the biggest problems when animals are stolen, is that it is impossible to tell whom it belongs to. The law says an owner must brand-mark animals older than six months, but many fail to do this. Stock thieves often try to change the brands, which makes it difficult to identify the true owner. It is vital to be able to identify animals so that the police can trace the actual owner. The AGD of ARC, which

has been helping the SAPS's STUs for many years, uses DNA from the blood, skin, meat, bones, intestines and even hair roots to identify an animal.

DNA is almost like a person's fingerprint – no two people's fingerprints are similar, nor is their DNA the same. A living being's DNA cannot be changed. Police all over the world have been using human DNA as evidence in courts for a long time, but now it can also be used to identify stolen animals. The inception of the LIDCAT system in South Africa is the brainchild of the AGD of ARC, which had taken note of the many small-scale farmers whose cattle were being stolen, and launched the project to help them. LIDCAT helps the police catch stock thieves by using animal DNA, as that 'fingerprint' stays the same throughout the life of the animal, and can be used even if it is dead. A drop of blood or a single hair is sufficient to help to identify a stolen animal. When livestock farmers use the LIDCAT system, they take a hair sample of each animal, which is then stored with the owner's particulars. When stolen livestock are found, AGD of ARC takes a hair or blood sample from the located animal (or an animal with disputed ownership), and traces its provenance. LIDCAT sends out a team, together with the SAPS's STU, to take hair samples of all the animals belonging to a specific farmer; they also brand-mark the animals and give them ear-tags. In the process, each animal is allocated a special number, almost like an ID number. When people then fight over an animal, or if an animal is stolen, the AGD of ARC simply takes a DNA sample and checks whether the animal's data are saved in the system. By using this method, they can easily determine which animal belongs to whom. Table 1 indicates the cost of using the LIDCAT system.

Table 1: The DNA parentage services and pricing

Service	Amount INCLUSIVE of VAT
DNA PROFILING:	
Cattle	R150.00 (sliding scale available)
Horses	R250.00 (or sliding scale, on request)
Pigs	R150.00
Sheep	R200.00
Goats	R150.00
Forensics	R550.00
Dexter Chondrodysplasia	R228.00
SPECIES IDENTIFICATION:	
Private	R300.00 (sliding scale available)
Forensic	R550.00
LIDCAT: Storage	R15/LIDCAT kit (additional charges if DNA typing is required)

* Prices are reviewed annually

Source: African Centre for Gene Technologies [ACGT] (2015)

It is strongly believed that the principal link between DNA technology and livestock farming lies in combating stock theft. It appears that conventional (traditional) methods fall short in addressing this scourge. Stock theft is a threat to South African livestock producers' very existence, having an impact on the long-term sustainability and profitability of the industry. Stock theft is a lucrative business which affects emerging and commercial farmers alike.

An average of 30 000 cases per year have been reported for the past five years, representing a monetary loss of R750 million annually.

From 1 April 2013 to 31 March 2014, 56 954 head of cattle to the value of R592 321 600 were stolen. Of this figure, 22 070 were recovered, meaning a loss of 34 884 head of cattle valued at R363 793 600. As regards sheep, 79 713 with a value of R135 512 100 were stolen. A total of 16 663 were recovered, resulting in the loss of 63 050 sheep, which cost producers R107 185 000. A total of 34 988 goats were stolen, of which 10 600 were recovered, resulting in a loss of R47 556 00 (Maré, 2014:np). Furthermore, on 24 January 2016, during a media briefing on the SAPS's Programme of Action for 2016, it was reported that only 727 cattle, 1 716 sheep and 116 other livestock had been confiscated during the 2014/2015 financial year – this, according to Lieutenant General Phahlane (former SAPS Acting National Commissioner). Former Police Minister, Nkosinathi Nhleko, mentioned that the SAPS management were in the process of introducing the Animal Movement and Animal Procedure Bill, which seeks to repeal the Stock Theft Act (No. 57 of 1959), by providing livestock farmers with a framework for monitoring animal movement and procedure. Currently, livestock farmers find it problematic to monitor their animals, according to eNews Channel Africa (eNCA, 2016:np). Despite being helpful, such legislative frameworks cannot combat stock theft in isolation, but must incorporate DNA technology and other available strategies.

Livestock farmers are encouraged to mark all livestock, as without identification it is impossible to prove ownership. Many role-players in the livestock production sector contribute directly to the high incidence of stock theft by ignoring the legal requirements set out in the Animal Identification Act (No. 6 of 2002), the Stock Theft Act (No. 57 of 1959) and other related acts which control the marking and movement of livestock. A legal, permanent mark is the farmer's responsibility and the first line of defence. Unmarked livestock mean that feedlots, producers, speculators, auctioneers, buyers and abattoirs cannot tell whether an animal was stolen. Should that be the case, those parties are contravening the law and are at risk of prosecution in terms of the Animal Identification Act (No. 6 of 2002). Hot-iron brand marks for cattle and tattoo marks for small stock are the most efficient and cost-effective ways of marking livestock.

The preceding section discussed approaches to combating stock theft across South Africa by looking at the function of the CJS. The evidentiary value of DNA is as vital as the work of national stakeholders such as the DAFF, plans such as the National Rural Safety Strategy (NRSS), the input of the Specialist Committee of the AGD of ARC, the South African Customs Union (SACU) and provincial stock theft forums (PSTFs), coupled with various KZN operations aimed at combating stock theft.

STOCK THEFT CONVENTIONAL COMBATING STRATEGIES: SOUTH AFRICAN OPERATIONS

National stock theft prevention approaches

During the first Southern African Regional Conference on Stock Theft, held 7–10 May 2002 in Pretoria, the six secretariats of the Southern African Regional Police Chiefs Cooperation Organisation (SARPCCO) countries represented there, mutually agreed on the need to formulate guidelines to control the movement of stock. The attendees discussed the use of DNA technology to aid in the identification of individual animals for the benefit of the livestock industry, and resolved to prioritise the following initiatives:

- A training curriculum for member countries that will focus on prevention, investigation, detection and joint operations;
- Uniformity of legislation relating to the control, movement and identification of stock, with a view to harmonising these laws;
- The enhancement of bilateral operations; and
- The more efficient exchange of information, including the installation of radio and telephone hotlines at identified points along the borders, KwaZulu-Natal Department of Community Safety and Liaison [KZN DCSL] (2008:20).

At the National Rural Safety Conference hosted in Midrand by the SAPS's National Crime Prevention Division, from 23–25 October 2001, the observation was made that improved socio-economic development would help combat stock theft, and that building the

prevention of stock theft into plans for developing rural areas was important, since stock theft committed against subsistence farmers dramatically increased their poverty and vulnerability (KZN DCSL, 2008:20).

Criminal Justice System intervention(s)

Stevens and Cloete (1996:3) note that the administration of justice is an important aspect of forensic and criminal investigation science, policing and criminological studies, since it refers to those institutions that deal with criminals (stock thieves) via the justice system, namely the police, the courts and the Department of Correctional Services (DCS), whose operations commence the moment a crime is reported, and end when a prisoner is finally released. Also included are the investigation of a crime; the tracing and arrest of a criminal; the prosecution, trial and pronouncement of sentence; and the detention, rehabilitation treatment and release of prisoners by the DCS.

In South Africa, the SAPS encompasses a national police service and an independent state department. The Commissioner of Police is answerable to the Minister of Law and Order. According to the Police Service Act (No. 68 of 1995), the functions of the police are to preserve internal security, maintain law and order, and investigate and prevent crime (see Stevens and Cloete, 1996:3).

- **The courts**

Although a distinction can be made between various types of courts in South Africa, their functions remain the same, namely to ensure justice for all, to punish the guilty, to safeguard the innocent against further prosecution by acquitting them, and to satisfy society's sense of justice by means of impartial action (see Stevens and Cloete, 1996:3-4).

Stock theft cases are normally tried in magistrates' or high courts, depending on the seriousness of the offence. The Magistrates' Court, through the district and regional courts, caters for civil and criminal matters respectively, with proceedings attempting to settle a stock theft case before a court chosen by the livestock farmer who is the

complainant (victim), and to administer justice fairly. Civil proceedings relate to the interpretation of a will, deciding on claims for damages caused, determining the mental capacity of a person who committed a crime, and granting an order of perpetual silence. The district court handles criminal matters, determines fines not exceeding R60 000 to be handed down to the perpetrator, and can impose sentences of imprisonment for a period not exceeding three years. According to Fouché (2007:20), a regional court has jurisdiction over all offences, including murder but excluding treason. The maximum punishment it may impose refers to a period of imprisonment not exceeding 15 years; and a fine not exceeding R300 000.

The amounts of the fines payable, as indicated above, may be adjusted by the Minister of the Department of Justice and Constitutional Development (DoJ & CD). Further, in terms of the Criminal Law Amendment Act (No. 105 of 1997), a regional court has to impose a minimum period of imprisonment for certain serious offences. In cases of robbery with aggravating circumstances, drug-dealing worth R50 000 to R10 000 (if a group or syndicate is involved), drug-dealing by law enforcement officers; dealing in or the smuggling of firearms, ammunition or explosives; possession of automatic or semi-automatic firearms or explosives; and in cases of corruption, fraud, *theft (stock theft in this regard)* and forgery involving an amount in excess of R5 000 000 (R100 000, if committed by a group of persons or a syndicate, R10 000 if committed by a law-enforcement officer), the period of imprisonment ranges from 15–25 years, depending on whether the person is a first or habitual offender. In the event of indecent or serious assault on a child under 16 years of age, a first offender must be imprisoned for at least ten years, and second and third-time offenders for 15–30 years respectively. Where a person was in possession of a firearm while committing a crime (stock theft included), the minimum period of imprisonment is five years for the first conviction, seven years for the second and ten years for a third (Chetty & Fouché, 2007:20). However, a livestock farmer has no influence on the enforcement of the application of the law in this regard, as the evidence handed to either of the courts will be treated independently and impartially,

therefore livestock farmers are advised to exercise their constitutional right to seek relief from the court of their choice.

• **The Department of Correctional Services**

When a person is found guilty of a crime by the courts, s/he may be sent to prison for a specified period. The main functions of the DCS are to rehabilitate a criminal, provide vocational training for prisoners, and keep them in safe custody in order to protect the community/public (see Stevens and Cloete, 1996:4). The SAPS reported on the 2015/16 financial year at the time when the present study was conducted (see tables 2 and 3).

Table 2: Targets per province for the 2015/16 financial year, according to the Efficiency Index

Rates	RSA	EC	FS	GP	KZN	LP	MP	NW	NC	WC
Detection	27.93	27.24	22.88	22.88	31.58	28.58	29.87	28.67	29	36.61
Cases to court	10.61	9.87	9.96	7.11	10.68	10.56	10.22	11.51	14.87	16.53
Trial-ready	66.88	69.38	64.38	64.38	72.09	64.38	70.53	89.20	75.07	66.95
Conviction	80.46	84.57	80.91	77.83	81.4	80.83	81.47	79.38	88.31	89.19

Source: Singh and Du Toit (2015:1)

Table 3: First-quarter performance to date (2015)

Rates	RSA	EC	FS	GP	KZN	LP	MP	NW	NC	WC
Detection	27.38	25.56	21.10	20.48	30.79	26.66	29.38	28.61	29.42	35.52
Cases to court	10.39	9.53	9.62	6.25	10.26	9.96	9.75	11.49	14.56	16.61
Trial-ready	66.88	65.62	52.69	47.91	72.26	50.61	69.25	89.78	72.45	64.90
Conviction	80.81	85.13	79.21	46.91	79.06	77.52	77.13	76.04	89.09	90.75

Source: Singh and Du Toit (2015:1)

It can be deduced from the first-quarter performance indicated in Table 4 that every unit must ensure that its performance is improved and maintained, in order to render a professional service to livestock owners across the country.

Table 4: Comparisons between the reporting period 2014/2015 to other relevant periods

	Zuma administration (2009/10 to 2014/15)				Mbeki administration (2004/5 to 2008/9)
Crime category	Increase/decrease during the reporting year 2014/15	Increase/decrease during the previous year 2013/14	NATCOM average annual increase / decrease 2012/13-2014/15	Average annual increase/decrease for three years of Zuma administration	Average annual increase / decrease during Mbeki administration
Stock theft	1.8%	-7.3%	-3.2%	1.0%	-5.4%

Source: De Kock (2015:13)

In a comparison of increases/decreases in stock theft as one of the more policeable crimes for different periods (2009/10–2014/15, and 2004/5–2008/9), the table speaks for itself. It is clear that during the Phiyega years (2012/13–2014/15) there were only small average annual reductions in stock theft (-3.2%). The hope is that the 1.8% increase in stock theft during the 2014/15 financial year was temporary, and not a developing trend. Bear in mind that stock theft poses a serious threat to the achievement of medium- and long-term objectives aimed at eradicating the socioeconomic root causes of crime (De Kock, 2015:12-13).

SAPS STUs across South Africa: Investigative process and challenges

Table 5: SAPS STUs per province of South Africa

Province	No. of units
EC	19
FS	11
GP	2
KZN	16
LIM	8
MP	8
NW	7
NC	7
WC	4
Total:	82

Sources: SAPS (2012:np) and NSTPF (2016:70-74).

During a 2010 meeting offering an overview of stock theft in this country, the Deputy Director-General (DDG) of the DAFF presented a briefing to the Parliamentary Monitoring Group (PMG) focusing on the current legal framework and the need to introduce a traceability system for livestock, similar to the system adopted in Botswana. The DGG acknowledged that the Animal Identification Act (No. 6 of 2002) made provision for the compulsory marking of cattle, sheep, pigs and goats, and the maintenance of a register of identification marks. Indeed, by 2010, approximately 521 000 identification marks had been registered and specialist SAPS STUs had been established. The register had been computerised, with access made available to the SAPS. This led to the establishment of the Stock Theft Forum (STF), with representation by the main stakeholders. Despite progress having been made, the DDG acknowledged that stock theft was rampant and had become a serious concern – something he attributed to the lack of an effective control system, the cross-border movement of animals, and stock theft syndicates operating in the country (PMG, 2010:np).

Investigation of stock theft

Myburgh (2007:63) interrogates the criteria for STUs, as prescribed by the SAPS, in an attempt to understand the success of efforts aimed at detection. To indicate the prevalence of stock theft across South Africa, Kubheka (2015:np) reports that while official statistics put the daily stock theft figure at 82 cases, the NSTP believed the true number was actually four times that. This, despite the forum appealing to farmers who had their livestock stolen to report cases to the police. In 2016, the Chairperson of the NSTPF, Willie Clack, was quoted as saying that their figures showed that stock theft cases were underreported by about 63%: “If we look at the amount of stock theft cases per year in South Africa, we have about 29 000 cases that have been reported, which in essence means 82 per day, instead of the 360 that should be reported. So we are actually receiving bad service from our government and we only created this problem for ourselves.”

The criteria for STUs

The responsibility to investigate crime, including the investigation of stock theft, is vested in the SAPS, as the Constitution of the Republic of South Africa Act (No. 108 of 1996), Section 205(3), determines that the police have a responsibility to

- prevent, combat and investigate crime;
- maintain public order;
- protect and secure the inhabitants of the RSA and their property; and
- uphold and enforce the law. (Myburgh, 2007:63)

The onus is on the SAPS, according to the SAPS Act (No. 68 of 1995), Section 13 (which is included in the mission of the SAPS, and forms part of the SAPS’s Strategic Plan for 2004–2007) (cited in Myburgh, 2007:64): its mission is to “(1) [i]nvestigate any crimes that threaten the safety or security of any community; and (2) [e]nsure that criminals are brought to justice; among other things”. To this end, Myburgh (2007:64) notes that the SAPS set five (05) key strategic priorities for the medium term, namely; Administration, Visible policing, Detective service, Crime intelligence and Protection and

Security Services. The investigation of stock theft is not mentioned specifically, but is included in the combating of organised crime. The SAPS Key Departmental Programme 3 of 2004 (S.a) (cited in Myburgh, 2007:64) highlights the fact that the focus is on the detective service for investigative duties regarding organised crime: key departmental objectives “contribut[e] to the successful prosecution of crime by investigating and gathering all related evidence, preventing the detection rate from decreasing”. The responding officials must “gather evidence, ensure that accused persons and witnesses are present at criminal trials and present evidence at criminal trials,” the report emphasises. As set out in paragraph 4 of the National Instruction 2/1999, and in the SAPS Head Office Circular 3/1/5/1/288 (cited in Myburgh, 2007:64), STUs are mandated to investigate the theft of the following livestock:

- Cattle - three or more;
- Sheep, goats and pigs - five or more;
- Horses and donkeys – three or more;
- Ostriches - three or more;
- Poultry - 100 or more;
- Game, in terms of the provision of the Game Theft Act (105 of 1999);
- All trends, regardless of the number of stock involved in each case; and
- All cases of cross-border stock theft, both international and provincial (Myburgh, 2007:64).

Moreover, all cases of slaughtering for the pot in the station area in which the office of a STU is situated, must also be investigated by them. According to the above mandate, it is clear that these units concentrate their efforts on the more serious cases, or those that are not the common case “of slaughter for the pot”. The exception is where a certain trend is discovered, for example where one sheep is stolen every month end, on a specific farm; or where one sheep is stolen during a specific night on a number of farms adjacent to each

other, indicating the possibility that the perpetrators targeted each farm as they travelled along the road (Myburgh, 2007:65).

RESULTS AND INTERPRETATION(S)

For this specific section of data presentation, analysis and interpretation, the following questions were asked during the FGDs and KIIs respectively. Notes were taken and a voice recorder was used to record the participants' responses:

- *How would you describe your experiences in the use of DNA technology in combating stock theft in your area?*
- *In your opinion, what are the challenges in using DNA technology to combat stock theft in your area?*
- *What would you say are the measures that can be applied to encourage relevant stakeholders' cooperation towards policing stock theft in your area?*
- *Do you believe the effective use of DNA technology in combating stock theft can influence the rate of prosecution in your area?*

The findings reported below were largely echoed by all the selected participants, regardless of the study location. For instance, their remarks regarding their experiences in the use of DNA technology to combat stock theft were similar. The participants (especially the SAPS KZN STU members and Anti-stock theft Association managers) indicated their knowledge of the use of this investigative tool, but the livestock farmers and DAFF officials were largely unfamiliar with it.

In this respect, the anonymous participants had the following to say:

DNA technology comes in where a livestock gets stolen or any dispute arise[s] relating to the ownership, we normally take blood of the parents together with the livestock (bull and heifer) under dispute, to send to the AGD of ARC in Irene to prove ownership. (KII-03:07:07)

In instances where a livestock is slaughtered [at] the crime scene, it is possible for us to link what we find there with a suspect through the use of blood ... in most cases, the blood found [on] the crime scene can be linked with clothing worn during [the] commission of [the] crime in question. (KII-1:13:13)

In one of the notable case[s] I dealt with involving the use of DNA technology, the suspect removed the ears of a slaughtered bull and place[d] them in the old carcass. My investigative intelligence led me into locating the-said ears. They [the ears] matched with the blood found [on] the crime scene and the meat [in] the suspect's possession, to create a positive link and the suspect[s] was arrested (awaiting trial at the time of the interview). (KII-03:07:07)

The general challenges experienced were also expressed by the selected participants:

The are many general challenges facing our STU in combating stock theft, to be specific; I am not referring to the commercial farmers as they are luck[y] in the sense that they have got electric fences, fences and security guards on the farm and they conduct farm patrols, among other things. The biggest problem faces our rural livestock farmers. I [grew] up with the Zulu nation. They usually practise livestock farming in the mountain, involving the entire clan (Mkhizes and Zondis) grazing in the mountain, especially the cattle, without fencing. It was so many years like that, you must understand that. It is referred as a communal grazing land. What they do is that they do not always kraal their animals [at the kraal], they look after their animals in the mountain. I always say to them as white people we put money in the bank, for example, R100 000.00 while with them [Africans] their (R100 000.00) roams in the mountain with no one looking after them. What is happening now is [that] they leave their animals in the

mountain and they do not have someone looking [after] their animals. They also do not count their animals on [a] daily basis, so when their animals are stolen by these thieves, as they see an opportunity that no one is looking after their animals and they do not kraal them, the syndicate will load the animals into a truck to transport to Umlazi where there is a huge market. (KII-5:1:1)

I recently lost five of my cattle and I did not get them [back]. I went on to look for them in a guessing way, as I did not know what to do. Stock theft is problematic in this area. Another challenge is posed by livestock 'auctioneers' across the province. It remains a known fact that livestock are brought for selling [at] auctions, without proper procedures ... verification of ownership is not conducted properly, channel[s] of procedures are strongly lacking, making money is the only option. (KII-1:13:13)

Local livestock farmers do not look after their livestock. (KII-1:13:13)

DNA technology is [a] great innovation, however the results take [a] long time back [feedback from the ARC laboratory]; it can take one to three weeks, but what is exciting is that the livestock farmers do not have to pay for anything for the case to be solved, and what is disturbing is that the SAPS do not have their own laboratory catering for this scourge. (KII-1:13:13)

The results feedback depends [on] the workload at ARC Irene. It is very essential to acknowledge the work[s] of [the] University of Pretoria, wh[ich] sometimes help[s] livestock farmers with the help of the local retired experienced police officer in [this] regard. However, the farmers have to pay for the tests to be performed. With us, we just apply for financial authority to assist in proving a case [on the] roll, this application process does not take time [either]. (KII-03:07:07)

In other cases, we find that the parents of the livestock stolen, slaughtered and lost are no longer alive, sold [the livestock owner did not keep it] and the case cannot be proved. (KII-1:13:13)

In cases where one of the parents [instances where the mother is already dead or cannot be found] is still alive, for example a bull with multiple offspring [at] a particular farm [many families own livestock coming from one bull]. This is normally done by someone who already knows how the system works [a suspect among them]. It is very difficult to approach cases of this kind. (KII-03:07:07)

The problem refers to the following:

- *Communal grazing land where there is no person looking after the animals;*
- *They do not count their animals on [a] regular basis;*
- *They do not kraal their animals;*
- *Another problem is that they do not brand-mark their animals. It is a fact that branded animals are unlikely to be stolen because they are branded. They do not brand-mark their animals owing to many reasons; one of them relates to cultural reasons (but we are currently educating them about that); and*
- *They also show [a] lack of interest at times, lot[s] of Zulu people are moving to town (urbanisation), they are becoming westernised as teachers and practising other occupations while practising livestock farming in the rural areas of KZN, leaving children looking after their animals. That is the problem, as well as [the fact that] there is no control. Animals that stray on[to] our roads and get involved in an accident ... it can be traced back to the owner and a civil claim can be instituted. (KII-5:1:1)*

On the measures that can be applied to encourage the relevant stakeholders' cooperation towards policing stock theft in their area,

the participants called for the integration of conventional methods with technological advances, while venting their frustrations about attempts to combat stock theft in their respective areas. As these two participant noted:

At the moment, I do not think it is only our STU, because it once happen[ed] in Moolman where 20 members had only one vehicle to work with, even in this unit we do not have vehicles, the vehicles they give us are 2X4 vehicles and we are now investigating wildlife cases and one cannot go to the parks with the 2X4. Sometimes we do want to go and attend to stock theft cases, but our vehicles are not in good condition and old. (FGDs-04:16:1)

The equipment to use to respond to stock theft in our surroundings [is] the biggest challenge ... we do not have proper vehicles and night vision [goggles], to name [a] few. There are so many things we need to have, to either prevent or combat stock theft. For reference sake: we do not have shaving equipment for livestock, we are currently helped by Sergeant Van der Merwe who uses his own equipment in this regard, when we apply for the necessary equipment they (SAPS) do not give us money, or send us from pillar to post. They are so many things that the SAPS is not doing, but it wants us to work effectively, which we cannot. Those are some of the challenges ... not [the] only challenges we [have]. The other frustrating thing is that sometimes when we talk to them they do not listen; the fact is; we cannot do our job properly without [the] necessary equipment. (FGDs-04:16:2)

Some of the selected STUs in KZN stated that they require resources and manpower to effectively deal with escalating stock theft in the area. They mentioned that they are under-resourced, thus the procurement of high-end and high-performance vehicles and other pivotal equipment suited to the terrain is needed, along with enhanced means of stock theft investigation. It is therefore essential for the selected STUs in KZN to have a suitable fleet of vehicles, and the

appropriate equipment, to be able to reach stock theft and poaching scenes and follow proper investigation procedures. The SAPS STUs should regard the input of all relevant stakeholders in recommending the type of vehicles and equipment they need to keep abreast of current criminal trends.

On the effective use of DNA technology in combating stock theft to influence the rate of prosecution in KZN, the participants were unanimous, stating:

The use of DNA technology can be used to improve on the number of cases in which DNA investigations are utilised, [to] give proper coverage in the media on [the] results of trial[s], without explaining detail[s] which can be used by offenders to counter scientific investigations, and [we have to] introduce the LIDCAT database concept to livestock owners. (KII-06-02-01)

Yes, absolutely, because culprits who would otherwise [have] got away can now be linked to crime scenes. One must further take into account that it is very rare to find willing eye-witnesses in rural communities who are prepared to testify against persons they know, simply because of the fact that once they testify, they live in fear of their lives. (KII-06-01-01)

There is no real impact in [respect of] combatting, but rather in evidence value. (KII-06-02-01)

Yes, however, it should be understood that this requires collective efforts from multi-agencies across KZN, it is not all about the use of DNA technology. The fact is; any methods which we think can be effectively used (which can work for us) to combat stock theft should be applied, although it is very difficult to recover a livestock once it gets stolen or lost. In short, it is very difficult to combat stock theft. (KII-1:13:13)

Yes, this is a collaborative effort, we work closely with ARC Irene and part of the DAFF (animal production) familiarise[s]

the livestock farmers and communities at large about the use of DNA technology in combating stock theft. (KII-5:1:1)

On the challenges of using DNA technology to combat stock theft in KZN, participants stated:

We make use [of] DNA technology, but we [encounter] a serious problem from our SAPS national head office. I would like you to write it down as it very important; we had instructions that our DNA evidence must be sen[t] for analysis within five days from the moment we receive animal DNA evidence, but now we first have to apply to our SAPS head office for financial authority for the procedures to undergo. This process takes up to three weeks for our head office to finalise th[e] application, in other words it is no [longer] five days ... we are waiting for twenty-six days because it is now twenty-one plus five. In essence, it takes too long to send our evidence to [the] respective laboratories. (FGDs-04:16:6)

Lack [of] trained capacity at stock theft units in the province and DNA investigations cannot be utilised in all instances of stock theft, simply because it does not exist on all crime scenes. (KII-06-01-02)

When asked about the factors impeding the effectiveness of using DNA technology to combat stock theft in their selected areas, they following was mentioned:

While noting the importance of DNA technology in combating stock theft, the[re] are issues that come up, like for instance, we had an issue the other day when one of our members received DNA results samples back from ARC-Irene and I really do not [know] what happen[ed] there, but the case numbers did not correspond with the cases numbers as sent to Irene. When it [came] back, it was completely differen[t] and the results received did not make sense. So we had to send back these results and make a query about it and then after that they eventual[ly] sen[t] back the results with correct case

numbers, but incidences of this kind do not happen a lot. (FGDs-04:16:8)

The current system does not comply with the systems of the traditional leaders; they can oppose anything with everything (might), that is the reason why we cannot have these improvements. There are more challenges, to be precise. (KII-01:01:01)

Quite [a] few of our cases ha[ve] been stricken off the roll because of the fact that we wait longer for the financial authority process to be finalised and still have to send the DNA evidence away and wait for another three to four weeks for the feedback from the laboratory In that period of time the court refuses to remand the dockets two and three times, and just strike[s] [them] off the roll. And by that time you receive positive results, then you have another problem, you struggle to go and find the accused as he/she is given bail or out and running away, and [you] struggle to locate that accused, that is also a big challenge that we have. (FGDs-04:16:6)

A friend of mine told me that the donkeys walking next to the road belong to no one if it is hit by a car, but if it gets stolen the owners will come forward, they will come after you with all they have, and you will quickly learn who the owner is. It is a big battle over the world, people think stock theft is only a South African problem, it is definitely not only our problem, it is a [problem the] world over. (KII-01:01:01)

Some of our local courts do not consider stock theft as priority crime, even when they give convictions they normally give three months or suspend the sentence. It is very important to understand the value of livestock for African people, as it is their back, their money. (FGDs-04:16:6)

Communal grazing lands, in that one bull may mate with several cows of different livestock owners over a period of

time. When animals are stolen, one will for example find DNA of both parents in the offspring. [There is] little knowledge of LIDCAT utilisation within the livestock owner community. Build [a] secure database for animal identification systems, collect[s] biological materials from individual animals and stor[e] it under ideal condition[s]. In the case of theft or dispute, the system can be used to identify the animal beyond doubt for court purposes, and build a database for research purposes. (KII-06-01-01)

We have got another case where I took human DNA using [the] buccal swab evidence method, taken from the suspect's mouth and ha[d] touch-DNA from the recovered firearm to send to Cape Town laboratory. It is five, six months in and we were told that it can take up to a year for them to send the results back. Touch-DNA can directly connect the suspects to the crime scene, if found and proven positive, it is like a fingerprint. We sent the samples and now we do not know which suspect(s) handled the firearm. Only if we can have a method of making this processes quicker, not a method of 'hurry-up-and-wait'. It should be noted that human DNA evidence results take very long to come back, sometimes it can take-up to six, seven months. (FGDs-04:16:5)

To be quite honest with you, we have had several problems now at ARC-Irene where I think the people who are currently analysing the DNA evidence are not up to standard. In the past we use[d] to have successes, but lately it is clear that the people doing the analysis are inadequate, we are experiencing [a] couple of problems (in analysing the DNA evidence) there. (KII 5:1:1)

The feedback from the laboratory takes long ... In a criminal case it can take up to six (06) weeks and sometimes three

months, the deadline is not adhered to and this create[s] problems with the court[s] of law, as stock theft cases get remanded, but is good to note that they are improving now, it is bit better, but it is a big challenge for us to get the DNA reports quickly. (KII-5:1:1)

“These refer to the experienced challenges, among others:

- *Lack of community involvement in some areas;*
- *Late detection and reporting of cases to SAPS by livestock owners;*
- *Non-marking of livestock by owners;*
- *Improper or non-safeguarding of livestock by owners;*
- *Ineffective actions by livestock owners themselves to prevent stealing of their stock;*
- *Porous international borders (Lesotho, Swaziland & Mozambique), however, cross-border stock theft in KZN is very low in comparison to the total stock theft picture of the province; and*
- *Filling of vacancies at remote STUs because of accommodation and schooling challenges. (KII-06-01-01)*

The view was expressed by the cited authors that criminally convicted SAPS members should, without exception, appear before a board of enquiry, to determine their fitness to hold office, as well as the South African Labour Court. In July 2014, about 173 KZN SAPS members were convicted of criminal offences, while the SAPS has admitted that hundreds of serving police officers are convicted criminals and the figures are shocking, but fail to reveal the full extent of criminality in the police services (Rademeyer & Wilkinson, 2013:np). The police should be placed under severe scrutiny and a comprehensive investigation should be conducted. If found guilty, officials should be charged with stock theft and be convicted.

When asked what strategies were used in their area, to address identified problems (that reduce the effectiveness of efforts to combat stock theft), the majority of participants reported having experienced

or dealt with stock theft cases. They suggested improvements for themselves (livestock farmers), while the local SAPS STUs voiced their own concerns. Both parties made recommendations for combating stock theft holistically, including the following (not in order of importance):

- Local livestock farmers should look after their livestock;
- Livestock farmers should recognise the importance of the Stock Theft Act (57 of 1959), the Animal Identification Act (No. 6 of 2002) and the Criminal Law (Forensic Procedures) Amendment Act (No. 37 of 2013) (the “DNA Act”), to name just three;
- Livestock farmers should frequently count their livestock to avoid the late discovery of thefts, which make any subsequent investigation difficult to initiate and complete;
- Livestock farmers should report stock theft cases immediately, without delay; and
- The majority of local commercial livestock farmers (especially whites) use Radio Frequency Identification (RFID) to control and monitor their livestock’s movements within their enclosed facilities. This system is reportedly very expensive for emerging black livestock farmers. This study proposes the optional combination of RFID, Wireless Fidelity (Wi-Fi), Wireless Sensor Node/Network (WSN) and ZigBee to cater for both livestock farming sectors, with the integration of Knowledge Management (KM), DNA tec

Amongst the proposals put forward are the following:

- *Awareness campaigns to communities and livestock owners, to be hosted by the DCSL;*
- *Marking of unmarked livestock by the Department of Rural Development and Land Reform (DRDLR); and*
- *Utilisation of Livestock Association meetings, Stock Theft Information Centre (STIC) to educate communities on the following aspects:*
 - *relevant legislation;*

- *the marking of livestock;*
- *hints to safeguard livestock;*
- *hints [regarding the] prevention of stock theft; and*
- *the utilisation of LIDCAT methodologies to build a database at AGD of ARC-Irene. (KII-06-02-01)*

So what we have done from [an] NSTPF perspective: we have applied to use the central analytical facilities (CAF) of [the] University of Stellenbosch, Cape Town as well, but the current government works with tenders, they presently [2016] got this tender with the AGD of ARC-Irene. They just bluntly refused to use any other laboratory. Another thing that makes it little bit difficult is that people do not want to pursue it because it is a [lengthy] process, it does not shorten the process, it does not speed it up, it only prolongs the process, that plays a huge role as well. (KII-01:01:01)

I do think that, although I am a very big supporter of tattooing and branding, we can use other means of animal identification and DNA technology is one of them, but the world is improving and changing. There are things like microchips, Bolus (Botswana and Namibia systems). In essence there are so many other means of animal identification. In all honesty, I think one of our biggest problems in [the] SA Constitution is that the status given to the traditional leaders, they have such a big impact on the current CJS. If they do not sign off on anything then that new law just does not get approved, like the Pounds Act [proposed National Animal Pounds Bill – Notice 398 of 2013] we have at the moment. We have struggled for the past three (03) years to get it signed off. It gets delayed at the traditional leaders' zone, they do not want to sign off on anything that is seen as a barrier to them. (KII-01:01:01)

When the participants were asked about their experience with regard to SAPS feedback about the investigation of stock theft cases in their area, their responses were as follows:

Good, this is a matter that is closely looked at during inspections of case dockets; however, there will always be room for improvement. (KII-06-01-01)

We must remember that since we [are] also doing wildlife cases, our DNA evidence also goes to the Pretoria National Zoo; and the Onderstepoort Veterinary Genetics Laboratory at the Faculty of Veterinary Science, University of Pretoria, if it is rhino and elephant, so our DNA go[es] to different places. The main problem is that we have to wait for financial authority from the SAPS head office. (FGDs-04:16:4)

But on another level, I think in South Africa this is not a communal farmer problem [any type of livestock farmer fits the bill]. This is a societal problem, we have a problem, we always try to look for problems, we never try to look for solutions, so we will always find reasons of why something is not working, but we struggle to find why things are working well. (KII-01:01:01)

RECOMMENDATIONS AND CONCLUSION

Alignment to DNA technology advances and improvements in selected areas of KZN

The implementation of DNA technology in combating stock theft in the areas under study is clearly subject to multiple challenges. However, this method should be viewed as an essential means of effectively addressing related crime. Commercial and subsistence rural livestock farmers are strongly advised to embrace technological advances and improvements. They should have access to the associated techniques, and the importance of those tools must be adequately shared, irrespective of geographical demographics. This system should be adopted to add to the already heavily utilised conventional ways of combating crime. Farmers should fully appreciate and understand the value of combining diverse practices to successfully address stock theft in a holistic manner. The value of using DNA technology was not clear to most study participants, thus

instead of using this application they tended to revert to conventional methods, such as brand-marking and tattooing, with greater emphasis tending to be placed on the current legislative framework of the Stock Theft Act (No. 57 of 1959) and the Animal Identification Act (Mo. 6 of 2002), while largely invalidating the use of the new the Criminal Law (Forensic Procedures) Amendment Act (No. 37 of 2013) and related international acts, World Organisation for Animal Health (OIE) standards.

The authors of this article propose that the effective use of DNA technology in combating stock theft can make a positive and significant contribution towards ensuring the safety and protection of livestock, as well as the economies of local communities (Maluleke, 2016:ix).

Common use of conventional methods to combat stock theft

At the time of the study, local livestock farmers in the selected areas of KZN relied heavily on branding and tattooing to protect their livestock against theft, which meant the implementation of DNA technology was underutilised. However, only using one method to combat stock theft cannot effectively and completely address related crimes (Maluleke, 2016:438). The national government should foster relationships with the relevant forensic laboratories across the country, for the effective implementation and utilisation of DNA technology to combat stock theft. The current reliance on AGD of ARC-Irene will not be optimally effective in the long run. The universities of Stellenbosch and Pretoria are examples of notable forensic laboratories which can add significant value through their speedy analysis of DNA evidence. Other private laboratories could also become part of the solution. SAPS management should consider building their own forensic science laboratory, to focus on stock theft in those provinces mostly severely affected by this scourge (KZN included). It is highly recommended that SAPS management reconsider the sole use of AGD of ARC-Irene, as its efficiency and capacity are currently being questioned (Maluleke, 2016:439).

Inadequate knowledge and application of the use of DNA technology

Clearly, the majority of participants had limited knowledge of the application of DNA technology in combating stock theft. DNA technology can stem the tide by providing a rapid means of identification, thus acting as a confirmatory forensic tool in animal identification. The value of this application is rapidly gaining momentum, as a means of combating, investigating and preventing crime, be it criminal or civil in nature.

It is recommended that more SAPS STU members be trained specifically in the use of DNA technology. It would be best if each STU had designated DNA technology experts collaborating with forensic laboratories across the country, as this could greatly assist the STUs in their investigations (for example in instances where livestock is stolen, illegally relocated or even slaughtered), by enabling them to use biological samples to link a potential suspect to the crime in question, or to exonerate an innocent person (Maluleke, 2016:440).

Lack of empirical studies on the use of DNA technology to combat stock theft

Maluleke (2016:vii) notes that the available studies on stock theft focus only on prevention through conventional methods. No study has been done on the use of DNA technology in combating stock theft in KZN and other provinces of South Africa. As DNA technology evolves, more applications will emerge to help us understand the genetic make-up of all living organisms. For the purpose of this study, DNA technology offers the means to irrefutably identify livestock. All livestock have a unique DNA profile, and, if such animals are stolen, illegally relocated or even slaughtered, biological samples can simply be taken and their DNA profile compared to those of reference samples to verify their identity, effectively linking perpetrators to crime scenes. The advantage of this practice lies in the identification of criminals with incredible accuracy when biological evidence exists, and in clearing/exonerating persons who have mistakenly been

accused or convicted of a crime, making it increasingly likely to ensure accuracy and fairness within the CJS.

REFERENCES

- African Centre for Gene Technologies (ACGT). (2015). *Animal genetics, Irene*. <http://www.acgt.co.za/facilities/animal-genetics-irene-2>. Accessed: 2015/07/8.
- Chetty, K.D. & Fouché, M.A. (2007). The South African judiciary. In M.A. Fouché (Ed.), *Legal principles of contracts and commercial law*. Durban: LexisNexis.
- De Kock, C. (2015, November). The 2014/2015 crime statistics – hope or despair? *Servamus – Community Based Safety & Security Magazine*, 108(11), 12, 13.
- Department of Justice and Constitutional Development, South Africa. (1959). Stock Theft Act (57 of 1959). Pretoria: *Government Printer*.
http://www.saps.gov.za/docs_pubs/legislation/juta/news1333.pdf Accessed: 2016/05/16.
- eNews Channel Africa. (2016). *SAPS outlines the 2016 year programme*, 24 January [Online].
<https://www.enca.com/live/saps-outlines-2016-year-programme?playlist=107> Accessed: 2016/05/03.
- Focus Group Discussions [KZN SAPS STU]. (2016). *Interview*. Ladysmith (KZN). (Notes in possession of researchers).
- Fouché, M.A. (2007). The South African judiciary. In M.A. Fouché (Ed.). *Legal principles of contracts and commercial law*. Durban: LexisNexis.
- Greyling, B. (2006). *Fight stock theft with LIDCAT*. UBISI Mail. Animal Genetics and Forensics Division, ARC, March 2006, 13 & 15.
- Key Informant Interview (Anti-stock theft bodies). (2016). *Interview*, KwaZulu-Natal. (Notes in possession of researchers).
- Key Informant Interview (Department of Agriculture, Forestry and Fisheries officials). (2016). *Interview*. Kwa Zulu-Natal. (Notes in possession of researchers).

- Key Informant Interview (South African Police Service Stock Theft Units members). (2016). *Interview*. Utrecht (Newcastle) and Pietermaritzburg, Kwa Zulu-Natal. (Notes in possession of researchers).
- Key Informant Interview (KwaZulu-Natal South African Police Service Stock Theft Units provincial coordinator). (2016). *interview*. durban central. (notes in possession of researchers).
- Kubheka, A. (2015). *New hope for drought-hit KZN farmers*. [Radio broadcast], November 30, East Coast Radio. <https://www.ecr.co.za/news-sport/news/new-hope-drought-hit-kzn-farmers/>. Accessed: 2015/12/02.
- KwaZulu-Natal Department of Community Safety and Liaison (KZN DCSL). (2008). *Stock theft in KwaZulu-Natal*. Pietermaritzburg: KZN Department of Community Safety and Liaison, [Online]. www.kzncomsafety.gov.za/.../0/.../STOCK%20THEFT%201%20PDF.pdf. Accessed: 2015/11/30.
- Maluleke, W. (2016). *The use of Deoxyribonucleic Acid technology in combating stock theft in South Africa*. Doctoral thesis, Tshwane University of Technology, Pretoria.
- Maré, J. (2014). Play your part to curb stock theft. *Farmer's Weekly*, 6 October [Online]. <http://www.farmersweekly.co.za/article.aspx?id=63563&h=Play-your-part-to-curb-stock-theft>. Accessed: 2015/09/16.
- Myburgh, P.A.J. (2007). *The need for specialisation in the SAPS: The case of the Stock Theft Unit in the Diamondfield Area*. Master's dissertation, University of South Africa, Pretoria.
- National Stock Theft Prevention Forum (NSTPF). (2016). Manual for the prevention of stock theft. In Grobler, K. (Ed.). *The farmer's guide to the prevention and handling of stock theft*. Pretoria: National Stock Theft Prevention Forum in collaboration with the Department of Agriculture, Forestry and Fisheries and Agri Connect (Pty) Ltd.
- Parliamentary Monitoring Group (PMG). (2010). *Overview of stock theft in South Africa*. Department of Agriculture, Forestry and Fisheries [Online]. <https://pmg.org.za/committee-meeting/11658/>. Accessed: 2016/04/16.

- Rademeyer, J. & Wilkinson, K. (2013). *South Africa's criminal cops: Is the rot far worse than we have been told?* Africa Check, 27 August [Online]. <https://africacheck.org/reports/south-african-criminal-cops-is-the-rot-far-worse-than-we-have-been-told/>. Accessed 2018/08/17.
- Republic of South Africa. (1995). Summary of the South African Police Service Act [No. 68 of 1995] (With Amendments). [https://ossafrica.com/esst/index.php?title=Summary of the South African Police Service Act%2C no. 68 of 1995 %28With Amendments%29](https://ossafrica.com/esst/index.php?title=Summary%20of%20the%20South%20African%20Police%20Service%20Act%2C%20no.%2068%20of%201995%20With%20Amendments%29) Accessed: 2018/08/30.
- Republic of South Africa. (1996). *Constitution of the Republic of South Africa* (as adopted by the Constitutional Assembly on 8 May 1996 and as amended on 11 October 1996). Pretoria: Government Printer.
- Republic of South Africa. (2002, June 3). Animal Identification Act (6 of 2002). *Government Gazette* 769, No. 23479 [Online]. http://www.saflii.org/za/legis/num_act/aia2002189.pdf. Accessed: 2015/11/16.
- Republic of South Africa. (2008). *Identification of Animals*. https://www.westerncape.gov.za/assets/departments/agriculture/identification_of_animals_feb2008_web.pdf. Accessed: 2015/10/28.
- Republic of South Africa. (2013). Summary: Criminal Law (Forensic Procedures) Amendment Act, 37 of 2013 (the 'DNA Act'). *Government Gazette* 583, No. 37268 [Online]. http://dnaproject.co.za/new_dna/wp-content/uploads/2015/02/SUMMARY-DNA-ACT-37-OF-2013.pdf. Accessed: 2015/10/20.
- Republic of South Africa. (2015). Application for registration of identification mark. https://www.westerncape.gov.za/sites/www.westerncape.gov.za/files/assets/departments/agriculture/application_for_registration_of_id_mark-120.pdf. Accessed: 2015/10/28.

- Republic of South Africa. (1997). *Criminal Law Amendment Act*.
<http://www.justice.gov.za/legislation/acts/1997-105.pdf>.
Accessed: 2018/08/30.
- Republic of South African Police Service. (2012). *New bill to curb
stock theft for public comments*.
http://www.saps.gov.za/docs_pubs/legislation/new/1-35269_19-4_police.pdf. Accessed: 2018/08/30.
- Singh, V. & Du Toit, M.P. (2015). *SAPS stock theft newsletter*, 14(1).
South African Broadcasting Corporation, Channel 2 (SABC 2).
(2017). *Leihlo La Sechaba* ['Eye of the nation'] [television
programme broadcast], November 27.
- Stevens, R & Cloete, M.G.T. (1996). *Introduction to criminology*.
Halfway House: International Thomson Publishing.