FACTORS AFFECTING TRACEABILITY OF CATTLE ACROSS NGUNI CATTLE PROJECT BENEFICIARIES

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INTRODUCTION

Cattle traceability was developed to enhance ownership, registration in breed associations and record keeping for animal performance and health status (CFIA, 2018). Traceability is defined as the ability to follow the processes that an item or group of items go through from one supply chain to the other. The same author reported that the basic elements include animal identification, location identification and animal movement. In addition, it is compulsory that all livestock be identified according to the Animal Identification Act (Act No. 6 of 2002) (South Africa, 2002). Cattle identification is one of the crucial ethical aspects as it involves human health, cattle production, preservation and management. Cattle can be reared in different locations and eventually be traded before slaughter. Even the slaughtering process can occur far away from the animal's original location, and it can lack the recognised information about the authentic source of cattle.

The freedom of animal movement from one location to another increases the risk of spreading animal diseases, and thus leads to the contamination of meat products (Brester et al., 2011). Therefore, knowing the origin of cattle is a significant determining factor about the health status of cattle and the quality of the meat products. Moreover, Zhao et al. (2017) argued that confirming the health of the living cattle and identifying diseases early is important for increased consumer awareness as well as food safety in the supply chain. Cattle traceability does not only help in controlling the spreading of diseases, but also increases the opportunity for beef exports. According to Brester et al. (2011), beef importing countries have adopted the use of traceability systems for their products and such systems are emerging as a prerequisite for market access. However, Musemwa et al. (2008) and Van Schalkwyk et al. (2012), reported that the majority of smallholder farmers sell their cattle on informal markets, where there are no requirements for proper animal records. One of the reasons for smallholder farmers are unable to use formal markets is their inability to meet market standards.

In many countries indigenous breeds have been regarded to be of lower market value than imported breeds because of their lower body weight. This has resulted in a reduction in the use of indigenous breeds while increasing the use of exotic breeds. However, exotic breeds are susceptible to harsh environmental conditions tick-borne diseases, feed scarcity and poor feed quality that are prevalent in most communal areas in southern Africa (Muchenje et al., 2008a). Exotic breeds require a high level of dietary supplementation especially during the dry season to maintain body condition (Muchenje et al., 2008a). Therefore, indigenous breeds such as the Nguni have been re-introduced to most communal areas due to their adaptive qualities, including resistance ability to parasites and production of high quality beef (Muchenje et al., 2008b).

Development programs to repopulate the Eastern Cape Province with indigenous breeds in communal areas have been made. Among other development programs, the Nguni Cattle Project (NCP) has been established where a number of Nguni heifers and bulls were distributed to selected communities to build nucleus herds (Fuller, 2006). The first program began in 1998 which was specifically aimed at reintroducing the Nguni breed in the Eastern Cape (Musemwa et al., 2008). The Eastern Cape NCP is a partnership between the University of Fort Hare (UFH), the Eastern Cape Department of Rural Development and Agrarian Reform (ECDRDAR) and the Industrial Development Cooperation (IDC). The project was established due to the high adaptability of Nguni cattle to harsh environments. According to a NCP report from the University of Fort Hare (Fuller, 2006), farmers in selected areas were provided with 10 in-calf heifers and two bulls with the aim of building a nucleus herd. After the period of five years the community gave back 10 heifers and two bulls to the project which were then passed on to another community (Raats et al., 2004). The requirements for the project were that the grazing area should be fenced and rotational grazing should be practised (Mapiye et al., 2007), as well as the replacement of existing bulls in the community by registered Nguni bulls, and castration or culling of the existing bulls (Musemwa et al., 2008). The major role of the project was to develop a niche market for Nguni products (beef and skins) and to introduce communal farmers to global markets through production and product processing (Raats et al., 2004). The project also aimed to train farmers on cattle management. The project development committee had the responsibility of training farmers, redistributing animals and developing infrastructure such as holding pens (Musemwa et al., 2008).

Irrespective of the benefits contributed by cattle, communal farmers face a significant number of challenges that restrict them from generating income from their livestock. These include cattle records that are commonly required by the formal markets. Most communal farmers are unable to give accurate information about when cattle were dosed and what type of medication was used. This has a negative impact on the economy of the country, as communal areas have high numbers (DAFF, 2017). The aim of the study was, therefore, to determine factors affecting traceability of cattle across the Nguni Cattle Project beneficiaries.

MATERIALS AND METHODS

Different geographical locations with different climatic conditions were used in the study. The study was conducted in six district municipalities of the Eastern Cape Province in South Africa, namely Alfred Nzo, Amathole, Joe Gqabi, O.R. Tambo, Chris Hani and Sarah Baartman. The geographical coordinates and pedo-climatic conditions of the study areas are presented in Table 1. The selection of these district municipalities was due to their participation in the NCP. The sample size of the study was 120 beneficiaries. All the NCP beneficiaries in these municipalities, who were willing to participate in the study, were interviewed.

Table 1. The geographical coordinates and pedo-climatic conditions of the study areas

District	Geographical coordinates	Rangeland type	Annual rainfall (mm)	Mean annual temperature (℃)	Altitude (m)
Alfred Nzo	30.54°S, 28.85°E	Sour	600-950	14-15	600-1400
Amathole	32.58°S, 27.36°E	Sweet	400-700	15-20	400-700
Joe Gqabi	30.98°S, 26.98°E	Sweet-Sour	400-700	12-16	1100-1600
O.R. Tambo	31.46°S, 29.23°E	Sweet-Sour	450-750	17-18	600-850
Chris Hani	31.87°S, 26.79°E	Sweet-Sour	400-700	12-16	400-1450
Sarah Baartman	33.57°S, 25.36°E	Sour	600-945	12-14	800-1350

Source: Mucina & Rutherford (2006)

Before the commencement of the data collection, a pilot study was done, where 10 farm workers of the University of Fort Hare who are also farmers, were selected for the interviews with the use of the questionnaires to be used for the study target group (NCP beneficiaries). The aim of the pilot study was to ensure that farmers do understand the concept and the objectives of the study. The pilot study was also conducted for the betterment of the questioning style and to determine the possible interview time.

The data were collected from the respondents using the questionnaires. The questionnaire was designed to include cattle record keeping, cattle buying and identification methods. The enumerators that assisted in data collection understood IsiXhosa and English since most respondents were IsiXhosa speaking and few needed explanations in English. The enumerators were informally trained on how to approach and record the information obtained from the respondents.

The data collected from the beneficiaries were coded and captured. The frequencies of cattle buying, records received when buying, formal livestock training received by farmers, record keeping and

identification methods were analysed using Freq of SPSS (SAS, 2016). The Chi-square test from SPSS (SAS, 2016) was used to determine the degree of association between the following categorical variables, demographic information, livestock formal training and cattle traceability of the beneficiaries of the NCP.

RESULTS AND DISCUSSION

The demographic characteristics of the NCP beneficiaries are presented in Table 2. The results of the current study show that of the 120 interviewed Nguni farmer beneficiaries, 85.8% were males, while only 14.2% were females. This accords with the results of Gwala et al. (2016) who found that in the agricultural sector of rural areas in South Africa, male farmers are dominating. The results show that 60.8% of beneficiaries were above 60 years, followed by 51-60, 41-50 and 31-40 with percentages of 28.3%, 8.3% and 2.5% respectively. Chris Hani district municipality had the highest number of beneficiaries (84.6%) above 60 years of age, while Joe Gqabi had the lowest number of beneficiaries (40%) at the same age range. The majority (94.2%) of the beneficiaries interviewed were married, while 5% and 0.8% of the beneficiaries were widowed and single, respectively. About 47.5% of beneficiaries had primary education (Grade 1-7) while 37.5% had secondary education (Grade 8-12). These results agree with the findings by Gwala et al. (2016) who found that about 59% of Nguni beneficiaries in two villages of the Eastern Cape Province had primary education (Grade 1-7). The results also reveal that the majority (55%) of the beneficiaries mainly depend on social grants and old age pensions from the government. This is in agreement with the findings of Molefi (2015) who reported that about 45% of the respondents in Mpumalanga mainly depended on pension as their primary source of income.

The association between district, demographic information, formal livestock training, cattle ownership, marketing and traceability factors are summarised in Table 3. The results show that district had a strong association with the record keeping and types of identification methods used, however, district had no association with cattle buying. The age of the beneficiaries had no association with cattle buying and type of identification methods used. However, education level had a strong association with record keeping and the types of identification method used. According to Mudzielwana (2015), education promotes understanding and knowledge of policies, which help to develop their farming skills. The source of income was found to have no association with cattle buying and the type of identification method used. As expected, formal livestock training had a strong association with record keeping and the type of identification method used. These results suggest that farmers with formal livestock training are more likely to keep records than those who have no training.

Table 2. Demographic characteristics of the Nguni Cattle Project beneficiaries (n = 120)

Demographic characteristics	**Number (%)**
Gender	
Male	103 (85.8)
Female	17 (14.2)
Age (years)	
31-40	3 (2.5)
41-50	10 (8.3)
51-60	34 (28.3)
>60	73 (60.8)
Marital status	
Married	113 (94.2)
Single	1 (0.8)
Widowed	6 (5)
Level of Education	
None	6 (5)
Grade 1-7	57 (47.5)
Grade 8-12	45 (37.5)
Tertiary	12 (10)
Primary Source of income	
Salary	10 (8)
Old age pension	66 (55)
Crops	3 (2)
Remittance	13 (11)
Other social grants	8 (7)
Livestock	20 (17)

Table 3. The association between district, demographic information and livestock training

	Record keeping	**Cattle buying**	**Type of identification method**
District	*	NS	*
Age	*	NS	NS
Education level	*	NS	*
Source of income	*	NS	NS
Livestock training	*	NS	*

* Significant at $P < 0.05$

Factors affecting traceability of cattle across beneficiaries of the NCP in the Eastern Cape are presented in Table 4, while the factors according to district municipalities are presented in Table 5. The minority of beneficiaries (20%) were buying cattle, while 80% were not buying cattle during the study. All the farmers who were not buying cattle reported that their reason for not buying was because the own enough stock themselves for breeding purposes. The majority of beneficiaries who were buying cattle reported that they buy bulls to breed with their stock. All the beneficiaries in Joe Gqabi municipality were not buying cattle, followed by Amathole (88.3%) and O.R. Tambo (75%) beneficiaries. This is due to the fact that most of the farmers in these municipalities own land and have desired herd sizes. Of the 120 interviewed beneficiaries, 37.5% claimed to receive records when buying cattle, while 62.5% did not receive cattle records. These results show that traceability is an important management issue that need to be addressed as it contributes to the health status of the individual cattle and the population at large.

Table 4. Factors affecting traceability of cattle across beneficiaries of the Nguni Cattle Project in the Eastern Cape (n=120)

Factors	**%**
Beneficiaries buying cattle	20.0
Beneficiaries received cattle records when buying	37.5
Beneficiaries received formal livestock training	50.0
Beneficiaries keeping cattle records	25.8
Identification methods	
Ear-tagging	23.0
Ear-notching	49.0
Branding	28.0

Table 5. Factors affecting traceability of cattle across beneficiaries of the Nguni Cattle Project of the Eastern Cape according to district municipalities (n=120)

Factors	**Districts (%)**					
	ATL	**ORT**	**JG**	**AN**	**CH**	**SB**
Beneficiaries buying cattle	11.7	25.0	0.0	35.7	30.8	33.3
Beneficiaries received formal livestock training	36.7	18.8	80.0	50.0	23.1	91.7
Beneficiaries keeping cattle records	16.6	12.5	80.0	42.9	23.1	50.0
Identification methods						
Ear-tagging	11.8	37.6	50.0	21.4	30.7	41.7
Ear-notching	73.4	43.7	0.0	50.0	7.7	0.0
Branding	14.8	18.7	50.0	28.6	61.6	58.3

ATL = Amathole; ORT = O.R. Tambo; JG = Joe Gqabi; AN = Alfred Nzo; CH = Chris Hani; SB = Sarah Baartman

The Nguni beneficiaries who received formal livestock training, such as animal handling, health and nutrition, were tied at 50% with those who never received formal training. Sarah Baartman was the leading municipality with 91.7% of beneficiaries obtaining formal training, followed by Joe Gqabi and Alfred Nzo with 80% and 50% of beneficiaries respectively. The O.R. Tambo and Chris Hani municipalities had the highest number of beneficiaries (81.2% and 76.9%) who had never received formal livestock training.

Only 25.8% of beneficiaries were keeping cattle records during the study, while 74.2% reported that they do not keep cattle records. The types of cattle records included cattle birth date and weight, parents' performance records and dates of medication application. The results of the current study agree with Mapiye et al. (2009) and Hangara et al. (2011), who found that about 85% and 95% of farmers were not keeping records in the communal areas of South Africa and Namibia respectively. All the farmers who were not keeping records reported, however, that they keep the records in their head without writing it down. For instance, on medication, they use their knowledge of the required withdrawal period to determine when the meat from an injected animal can be consumed. However, the inability to keep records has an effect on their participation in the formal market, for example at abattoirs and feedlots, as these records are required.

Joe Gqabi was the only municipality where the majority (80%) of beneficiaries were keeping cattle records during the study. As reported before, farmers in this municipality are land owners and are making use of different market channels, therefore they require records to have access to the formal markets. O.R. Tambo and Amathole had the most beneficiaries who were not keeping cattle records, with 87.5% and 83.3% respectively. Therefore, the beneficiaries in these municipalities are less able to sell their animals to the formal markets.

Ear-notching was the most commonly used cattle identification method, with 49% beneficiaries, while 28% and 23% were using branding and ear-tagging respectively. The current study is in contrast to the study by Hangara et al. (2011) who reported that branding was the most commonly used cattle identification method, compared to ear-notching and ear-tagging, by farmers in the Omaheke Region in Namibia. The differences between the current study and previous studies may be due to the fact that the previous studies included many farmers who were more informed about livestock practices such as branding, while the current study is dominated by poor resourced farmers who have less knowledge. Ear-notching is less recommended and needs to be reduced as it causes bleeding, which can lead to infections and more distress to the animal (Hangara et al., 2011). In addition, the same author reported

that ear-notching is not scalable and can only identify a few animals, therefore it is not suitable for large herds.

The Amathole and Alfred Nzo municipalities had the majority of beneficiaries using ear-notching, with 73.4% and 50% respectively. These municipalities are dominated by village-owned enterprises, hence they mostly used ear-notching. Joe Gqabi municipality has only group-owned enterprises (farms), hence there are no beneficiaries in this municipality using ear-notching. The beneficiaries in Joe Gqabi using branding and ear-tagging were tied at 50%. Chris Hani and Sarah Baartman had the majority of beneficiaries using branding with 61.6% and 58.3% respectively. According to Hangara et al (2011), the branding method does not provide sufficient reliability and accuracy as it can be easily altered or duplicated.

CONCLUSION

Many beneficiaries of the Nguni Cattle Project are not buying cattle as they are satisfied with their cattle numbers, while the majority of those who buy cattle do not receive records from the sellers. This has a negative effect on traceability, as there are no details of cattle health status and the location in which cattle were reared. The majority of the beneficiaries are not keeping cattle records, however, farmers who are land owners keep cattle records because of their participation in the formal market. Ear-notching is the mostly used identification method by the Nguni beneficiaries, especially by the village-owned enterprises. It is recommended that policy makers of the Nguni Cattle Project must invest in training farmers on traceability aspects as this affects their participation in the formal market, and therefore affects their level of commercialisation.

ACKNOWLEDGEMENTS

The following persons / institutions are acknowledged for their contribution to this study:

- National Research Foundation (NRF), the Nguni Cattle Project (Project P329) and Govan Mbeki Research Development Centre (GMRDC), University of Fort Hare for the funding
- The Eastern Cape Nguni Cattle Project beneficiaries for their participation in the study
- Personnel at the Department of Livestock and Pasture Science, University of Fort Hare.

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