NSAP 47th Annual Conference (JOS 2022) CONFERENCE PROCEEDINGS
THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

TAKING ADVANTAGE OF GLOBAL POSITIONING SYSTEM TO TACKLE THE PREVAILING RUSTLING OF CATTLE IN NIGERIA: A REVIEW

Samani Emmanuel[1] and Oshibanjo D.O[2]

Department of Mining Engineering, University of Jos, Plateau State, Nigeria.[1]
Department of Animal Production, University of Jos, Jos[2]
Email: samemma1965@gmail.com, 2018en0031@unijos.edu.ng
Tel: +2348111711565

Abstract
Cattle rustling is on rising in Nigeria; has grown in scale and increasingly becoming an uncontrollable issue especially in the northern region of Nigeria. This acrimonious situation has been in play over the years, the herders are becoming handicap and the governments at local, state and federal were slow or rather not giving any concern to implement any policy to help curb this prevailing issue. This review is aiming at pinpointing a modern way to tackle cattle rustling in Nigeria. There are many ways to tackle this issue, such as Global Positioning System (GPS) trackers that will be more efficient and lasting, putting an end to cattle rustling. The Global Positioning System (GPS) is capable of providing real-time location of the cattle and its physical condition. In recent years, collar or ear tag GPS trackers are been used to track cattle when they are been rustled but the location of the GPS on the animal is proved to be ineffective as it can easily be removed, therefore this paper is looking into a newer yet not available way to place this GPS tracker in the animal without the rustlers noticing it- implanting underneath the skin of the cattle.

Keyword: *Cattle, GPS, Rustling, Tracking and Technology,*

Introduction

The methods of traditional animal husbandry are changing, not only in Nigeria but across the African countries where pastoralism is practiced. There are over 25 million pastoralists spread in almost all the countries in Africa (African Union, 2010). The pastoralists are major players in livestock production, particularly in the breeding of ruminant livestock. In West Africa, livestock production contributes to nutritional and food security; poverty reduction; and foreign currency earnings in most Sahelian countries. Livestock and poultry production represents 33%, 14.6%, and 18% of the GDP of Mali, Mauritania, and Niger, respectively (Molina-Flores *et a.*., 2020). In Nigeria, livestock was accounting for about 26% of the agricultural GDP and about 10% of the Nation's Gross Domestic Product in the 1990s, but the level of this contribution has significantly declined with agriculture contributing only about 0.2% of the GDP in the third quarter of 2021 (Statista Research Department, 2021) due to many factors; one of it been cattle rustling.

There are many challenges limiting the contributions of the livestock sub-sector to the socio-economic development of Nigeria. Some of the challenges facing the sub-sector include low productivity resulting from the pastoralists' adoption of traditional breeding techniques; the degradation of rangelands due to overgrazing and climate change; and conflicts between pastoralists and farmers. In recent years, cattle rustling in the North-western and Middle Belt areas of Nigeria has further affected the productivity and viability of the sub-sector. Incidences of cattle rustling have significantly expanded in Nigeria since 2010 in many States thereby affecting the livelihoods of pastoral and agricultural households.

However, reduced access to the natural grassland for grazing, and water caused by cattle rustling has undoubtedly and increasingly put pastoralists under intense pressure for survival, in other words, the continued wave of cattle rustling across Nigeria has not only affected cattle producers' substantial contributions to the nation's economy but hampered their economic and welfare support to their households,

villages, and towns (Manu, *et al.,* 2014). Cattle rustling is defined as a criminal intent to expropriate cows from the owners for meat and sale, the act has reportedly evolved into a pattern of organized crime with immense criminal sophistication and efficiency (Alemika, 2013).

Okoli and Okpaleke (2014) also viewed the menace as a global phenomenon that now manifests in various scales and dimensions across nations. For instance, Daily Trust (2014) in Okoli and Okpaleke (2014) revealed rustling of 300 cattle in 2013 in Scotland necessitating government declaration of cattle rustling as a national emergency. In Cameroon, Manu *et al.* (2014) noted a fundamental transformation of the scenario from a cultural practice of testing one's bravery and prowess to bloody warfare between various groups or communities. This same source further revealed the rustling of 2,599 cattle in North West Cameroon between 2008 and 2012. The act was reportedly massive in Lesotho causing widespread chronic poverty and inability of rural households to apply asset smoothing (Dzimba and Matooane, 2005).

In Nigeria, the scenario has continued to rise, particularly in the northern part of the country where livestock production is dominant. It is also revealed that the scenario which presently takes the dimensions of petty/localized rustling, inland rustling, and trans-border rustling has claimed about 60,000 cows and killing of 322 herders in northern Nigeria in 2013 (Daily Trust, 2013). Okoli, (2014), Daily Trust, (2014), Okoli and Okpaleke, (2014) reported a recurrent trend in some northern States leading to loss of animals, human lives and economic gains. All these and many more to come are seeking for a solution and a definite answer; hence taking advantage of new technology to tackle this prevailing issue is necessary.

For many years the only way to track cattle or animals generally when they are rustled was to simply follow and observe their footprint or just wait and hope that the cattle in the future will return; which most often times they are gone forever. But the advancement in the world of technology, a solution to this myth can revert by the use of radio-tracking systems. Basically, there are three types of radio-tracking systems available and in use today: (i**.) Very High Frequency (VHF) Radio Tracking**, (ii) **Satellite Tracking**, and (iii) **Global Positioning System (GPS) Tracking**.

i. VHF Radio Tracking: VHF Radio Tracking has been in use since 1963. In order to use VHF radio tracking, a radio transmitter is placed on the cattle. Usually, the cattle are first sedated. Once the radio transmitter is placed on the cattle, it begins transmitting a signal to a radio antenna and receiver. In order to locate an animal using VHF radio tracking, the herder must be close enough to the animal with the radio antenna so they can pick up the signal from the radio transmitter on the animal.

ii. **Satellite Tracking**: Satellite tracking is similar to VHF radio tracking, but instead of a radio signal being sent to a radio receiver a signal is sent to a satellite. With satellite tracking, herders don't have to be near the cattle to pick up its signal. They can track the animal using a computer or a mobile phone. This loggerhead turtle is heading out to sea, but herders will be able to track its movements using the signal the transmitter on its back sends to a satellite.

iii. Global Positioning System (GPS) Tracking: The GPS tracking is the newest technology being used to track cattle and other animals. In GPS tracking, a radio receiver, not a transmitter, is placed on the cattle. The radio receiver picks up signals from special satellites. The receiver has a computer that then calculates the location and movement of the animal. The data gathered by the receiver is then sent to another set of satellites. The second set of satellites then sends the data to the herders.

The Global Positioning System (GPS) tracking system is preferred to other type of radio tracking system. A GPS tag calculates the location of cattle or any animal at specific time intervals using positions estimated by a network of satellites. These locations can be stored on-board the tag or transmitted to the user through a communication network (for example, Argos satellites or the GSM network) or through wireless downloads from a custom base station. These tags can provide high-resolution and accurate (within meters) location estimations for animals.

Livestock tracking with GPS is not a brand-new technology, but it has surfaced and became more prominent in the past several years. This monitoring technology offers many benefits to farmers. It has various potentials such as monitoring the movements, patterns of plot grazing, water combating theft, prevention of various diseases, reducing the manual labour, easy identification of the animal, etc. Utilizing GPS

tracking device for cattle has proved to be the best option to monitor all activities of your animals and gain real-time information to make well-informed decisions (Animal Care, 2021).

Operational modalities of Global PositioningSystem (GPS) the system is an alert-based system that is majorly made up of the GPS and Global System for Mobile Communication (GSM) module. Both modules are embedded in a circuit that is placed in a collar worn on the cattle. As such, the collar calculates the coordinates of the cattle with the aid of the GPS module and transmits the detected coordinates as well as warning messages as a Short Message Service (SMS) to the cattle farmer with the aid of the GSM module. There are conditions that are met before which the system transmits the location of the cattle to the cattle farmer. These conditions include; when the collar is broken from the cattle via thieves or by the cattle itself when the cattle exceed the crosses the virtual fence or assigned grazing route when the battery of the collar is low and whenever the cattle farmer calls to interact and know the position of the collar or the ear tag.

Challenges of using Global PositioningSystem (GPS) for battling cattle rustling in Nigeria

Although considerable progress has been made during recent years, important issues remain to be resolved, such as the location of the GPS on cattle, the size and battery/charging of the current GPS in used today, and finally, the local network service providers. Unlike microchips, a GPS tracker cannot be implanted underneath the skin of the cattle. With the collar or ear tag GPS, it can easily be removed by the rustlers if they get to discover it's a GPS since it is obvious and anyone can see it; Another challenge is the size of the GPS on the cattle, they are considerably large and relatively heavy; battery and charging is another challenge encountered with the use of collar or ear tag GPS tracking. The poor quality of service of the local network service provider in Nigeria is another major challenge militating against the use of GPS trackers in Nigeria.

Solutions to the challenges of using ofGlobal PositioningSystem (GPS) for battling cattle rustling in Nigeria

Having looked at the major challenges faced by GPS tracking for cattle, proposing a solution to curb this clampdown is essential to help researchers look closely into this prevailing issue and to develop a very tiny tracker that can implant underneath the skin of the cattle. Although these trackers are not available now, the future technological advancement could see trackers being compressed into very small dimensions like eight (8) millimetres long and two (2) millimetres thick- nearly the size of a grain of rice, they will be small, lightweight and uses the heat generated by the body to charge its battery and enclosed in a glass cylinder. At this size and a new feature, trackers can be safely implanted underneath the skin of cattle, making them unseen and undetected unless with the aid of a metal detector. This could see cattle rustling becoming a thing of the past as the implanted GPS tracker could provide real-time information about the cattle anytime and anywhere in the universe.

Conclusion

Cattle rustling is one of the critical dimensions of public insecurity in contemporary Nigeria. This review was done to scheme a redesign of cattle monitoring systems for tracking cattle combating rustling in extensive grazing areas, grazing reserves, grazing routes and ranches by designing a GPS Tracker which would be implanted underneath the skin of the cattle. This system would not only combat cattle rustling activities but would also serve as an anti-theft system. It is clear that research projects on GPS trackers implanted underneath the cattle or any animal skin have had limited scope as compared to collar or ear tag trackers. However, if successfully developed and implemented, it could see cattle rustling becoming a thing of the past. This system would provide cattle farmers with the opportunity to fully monitor their herd within a particular grazing region.

References

African Union. (2010). "Political Framework for Pastoralism in Africa: Securing, Protecting and Improving the Lives, Livelihoods and Rights of Pastoralist Communities". *Addis Abab*

Alemika, E. E. O. (2013). *Organized crime and governance in West Africa:* Overview in E.E.O Alemika (Ed.), *The Impact of organized crime on governance in West Africa*. Abuja: Friedrich-Ebert-Stiftung (Abuja Regional Office, Abuja).

Animal Care (2021) *GPS cattle tracking* https://animalcare.folio3.com/gps-cattle-tracking/(accessed December 16, 2021).

Daily Trust (2014 February). *Investigation: 322 herders killed; 60,000 cattle rustled in 2013*. *Daily Trust online* at http://dailytrust.info/likked-60,000-cattle-rustled-in-2013 (accessed December 16, 2021).

Dzimba. J. and Matooane, M. (2005). *Stock Theft and Human Security: A Case Study of Lesotho*, http://www.iss.co.zaJpubs!MonographsfNo113/Acknow.htm

Manu, L. N., Andu, W. N., Tarla, D. N. and Agharih, W. N. (2014). Socio-economic effect of cattle theft on the pastoralists of the North West Region of Cameroon. *Journal of Agricultural Science* Vol. 4(6), pp. 299-305 June, 2014. http:// www.scholarly-journals.com/SJAS. (Accessed December 15, 2021).

Molina-Flores, B., Manzano-Baena, P. and Coulibaly, M.D. (2020). The role of livestock in food security, poverty reduction and wealth creation in West Africa https://www.fao.org/documents/card/en/c/ca8385en/ (accessed December 14, 2021)

Odoh, Chigozie, Abbass (2012). International Journal of Engineering Science Invention. 2015; 4:23-33.

Okoli, A.C and Okpaleke, F (2014). Banditry and Crisis of public safety in Nigeria: Issues in national Security strategies. *European Scientific Journal*, 1 0(4), pp.350-362.

Okoli, A.C. (2014). Disaster management and national security in Nigeria. *International Journal of Liberal Arts and Social Science*, Vol. 2(1) pp. 21-59.

Statista Research Department, Brahms Kontor (2021). https://www.statista.com/statistics/237632/production-of-meat-worldwide-since-1990/