



Prevalence and Effects of Oxpeckers Interactions on Cattle at The Federal University of Agriculture Cattle Production Farm Abeokuta



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OXPECKERS activities are emerging challenges confronting cattle farmers apart from pests and parasites requiring the need to understand the relationship existing between them and the cattle. This study determined the prevalence and effects of oxpeckers' feeding habits at Federal University of Agriculture, Abeokuta, Nigeria. Fifteen visitations were made to the herd of 230 cattle between 7:25 and 8:45 am to observe oxpeckers interactions over a period of three months. The number of observations, perching site, feeding and non-feeding activities, inflicted wounds, tolerance and intolerance behaviors of cattle were recorded. Data obtained were analyzed with descriptive statistics using SPSS version 20 and the result was expressed in frequencies and percentages. Pearson chi square test was used to determine significant differences between breeds and coat colours with the p -value less than 0.05 ($p > 0.05$) was considered significant. Out of the 230 cattle, 201 (87.4%) were infested with 635 oxpeckers (*Buphagus africanus*) with the White Fulani breed having the highest prevalence of infestation 152 (75.6%), while Bokolo was lowest 11 (5.5%). White colour was highly infested 144 (71.6%) with lowest in black. Twenty two (10.9%) out of the 201 infested cattle had wounds with white colour 13 (59.1%) being the highest followed by black and white. In conclusion, oxpeckers are more attracted to white colour than other colours. The relationship between oxpeckers and cattle can be switched from mutualism to parasitism under certain conditions.

Keywords: Cattle, Interactions, Mutualism, Oxpeckers, Parasitism.

Introduction

Agriculture is an important sector of the economy contributing about 21.2% to Gross Domestic Product (GDP) and 36.5% to employment which is divided into crops and livestock sectors and these have a vital role in socio-economic development of the country [1].

In Nigeria, it contributes around 1.7% to the

national GDP. The recent estimates of Nigeria's livestock herd are 18.4 million cattle, 43.4 million sheep, 76 million goats and 180 million poultry [2].

Indigenous breeds of cattle in Nigeria are the White Fulani, Red Bororo, Sokoto Gudali, Adamawa Gudali, Wadara, Azawak, Muturu, Keteku, Ndama and Kuri [3]. These command a prominent position in our meat supply and livestock industry [4]. Various production

practices have been adopted in the management of cattle; the extensive or pastoral system (82%), the semi-intensive or agro-pastoral system (17%) and the intensive or commercial system (1%) with income of 67%, 38% and 100, respectively, among keeper [5]. Cattle management using the extensive system involves the farmer providing a natural habitat where animals can graze and exhibit their natural behaviors such as eating, walking and vocalizing which are beneficial to the well-being of the cattle [6]. However, the extensive farming systems are faced with various challenges such as poor growth due to inadequate nutrition leading to low body condition which impairing the immune system of the animal thereby resulting in a negative effect on the health status of the animal [7], high risk of toxicity due to extensive grazing system in which the animal can consume plants containing plant secondary compounds (PSC) which has both positive and negative effects depending on the dose, form and species of the plant exposed to [8], a risk for an occurrence of diseases influenced by several factors under extensive system [9]. Some diseases are more encountered in the extensive system of farming such as external parasites [9]. Therefore, there is high chance of cattle contracting tick borne diseases like babesiosis, anaplasmosis etc. [10]. Oxpeckers feed mainly on what they can harvest from the skin of cattle. Ixodid ticks are known to be the main diet of oxpeckers but it has also been reported that they feed on dung, earwax, insects, mites, lice, hair, scruff cells, and secretions (eyes and nose) from their hosts [11]. Oxpeckers relationship with cattle can be mutualism, commensalism or parasitism [12, 13].

Relationship between oxpeckers and cattle are more of mutual where birds obtain their food majorly ticks, from the cattle and in turn this habit help reduces the ectoparasite loads on cattle species [14], thereby reducing chances of cattle contracting vector-borne diseases [15]. However, the removal of ticks by oxpeckers benefits both the host and the birds. On the other hand, oxpeckers threaten the animal well-being as they feed on other food sources found on the host [13]. Other food sources include dead or live tissues, blood, secretions and organic debris [13,16], which implies that oxpeckers may even ignore available ticks and parasitize the animal by consuming 2 host tissues [17,11] and blood gotten from open wounds. During ticks scarcity, oxpeckers feed on wounds present on their hosts rather than them to prey on ectoparasites because it is more

cost effective [11]. This association could be parasitism or commensalism meaning it is not always mutualistic. Oxpeckers may actually help the host positively by cleaning wounds of botflies and maggots but inflict negative effects on the as they feed on an already clean or open wound, such as blood loss or irritation, the attraction of flies and delayed wound healing which increases the risk of secondary infection for the host [11].

With the growing demands for proteins of animal sources, exploring ways of improving carcass quality become imperative. It is thus, important to explore and encourage ways to reduce factors that grossly affect the quality of cattle production [18]. Activities of oxpeckers on cattle may affect the carcass quality and physiological condition of the host, thereby resulting into poor yield. This study was aimed at establishing the effects of oxpeckers on Cattle production in Federal University of Agriculture, Abeokuta Cattle Production Venture (CPV).

Material and Methods

Location of study

The study was carried out in the Cattle Production Venture on the University Farm, Federal University of Agriculture, Abeokuta on latitude N 70 13'58.2708" and longitude E 30 25'12.82224".

Sampled animals

Two hundred and thirty (230) in the herd belonging CPV were observed for the presence and activities of oxpeckers.

Assessment of the activities of oxpeckers/Study procedure

All the cattle in the herd were observed for oxpecker infestation, feeding and non-feeding activities, perching sites, inflicted wounds and intolerance behaviors of cattle as described by Plantan [12]. For each time infested cattle were observed, the following data were collected: (1) Identification/Tag number of the host cattle species, breed of the cattle, number of oxpeckers on the cattle, coat colour of the cattle, presence or absence of wounds on the host, location of oxpeckers on host, behavior of each oxpecker, host response (tolerance or rejection) and time of observation. Observations were done early in the morning (7:25am – 8:45am) which coincides with oxpeckers' peak feeding periods. Rejection behavior was divided into head shake, skin twitch, tail twitch, rolling on the floor by the cattle and walk away. Feeding behavior was divided into

feeding behavior (anogenital, ear wax, mucous, skin flakes and wound) and non-feeding behaviors (perching, preening or sand bath). Behavioral observation of birds was done within a two-minute period or until the bird is no longer visible or flew off the host.

Data Analysis

Data obtained were analyzed with descriptive statistics using SPSS version 20 and the result was expressed in frequencies and percentages. Pearson chi square test was used to determine significant differences between breeds and coat colours with the p -value less than 0.05 ($p > 0.05$) was considered significant.

Results

Prevalence of oxpeckers infestations and inflicted wound

A total of 635 yellow-billed oxpeckers (*Bughagus africanus*) were recorded during this study. Out of the total 230 cattle observed, 201 (87.4%) were infested by oxpeckers and they comprised of 152 (75.6%) White Fulani, 11 (5.5%) Bokolo and 38 (18.9%) mixed breeds. A total number of 635 oxpeckers were observed on the cattle with the White Fulani having the highest infestation. The white-coloured cattle were the most infested among all the colours with the prevalence of 144 (71.5%) followed by the black and white colour. A total of 22 (10.9%) animals had a varying degree of wounds with White Fulani breed having the highest 20 (90.9%), while mixed

breed recorded 2 (9.1%). There was no wound among the Bokolo breed. The white-coloured cattle had the highest percentage of wounds which was followed by the black and white colour. There was no statistically significant difference ($p > 0.05$) between the breeds and colours as per inflicted wounds (Table 1).

Interactions of oxpeckers on cattle, body location and resistance behavior of cattle

Different feeding, non-feeding, resistance and body location interactions were exhibited during the period of observations (Table 2). The recorded observations for feeding interactions showed that skin flakes were the most preferred feeding with 107 (38.2%) out of the total 180 observations. Others were ear wax feeding 91 (32.5%), mucous feeding 41 (14.6%), wound feeding 22 (7.9%) and anogenital 19 (6.8%) observations. The non-feeding observations were preferentially perching, preening and sand bath in this order. The preferred body locations observed were head 119 (40.3%), rump 61 (20.7%), belly 40 (13.6%), hump 23 (7.8%), vulva 19 (6.4%), side 19 (6.4%) and limbs 14 (4.7%). The resistance behavior of the cattle ranged from head shakes to rolling on the floor. The prevalence of resistance behavior was highest in head shake 144 (49.1%) out of the 293 observations. Other exhibited behaviors were tail twitch 47 (16.0%), skin twitch 46 (15.7%), tolerance 31 (10.6%), walk away 24 (8.2%) and roll on the floor 1 (0.3%) observations.

TABLE 1. Prevalence of Oxpecker infestation and inflicted wound on cattle

Breed	No. of cows in Herd	Percentage of infestations	No. of oxpeckers on cows	Presence of wounds	Prevalence (%)	X ²	P-value
Bokolo		11(5.5%)	25	0	0		
White Fulani		152 (75.6%)	510	20	90.9		
Mixed breed		38 (18.9%)	100	2	9.1	3.374	0.185
Coat Colour							
Black		4 (2.0%)		1	4.5		
Brown		15 (7.5%)		1	4.5		
Black & White		29 (14.5%)		6	27.3		
Brown & White	230	9 (4.5%)		1	4.5	4.461	0.347
White		144 (71.6)		13	59.1		
Total		201 (87.4%)	635	22	10.9		

TABLE 2. Interactions of oxpeckers and resistance behaviors of cattle

Feeding interactions	Non-Feeding Interactions	Resistance Behaviors	Body Location
Skin flakes	Perching	Head Shake	Head
Ear wax	Preening	Tail Twitch	Rump
Wound feeding	Sand bath	Skin Twitch	Vulva
Mucous feeding		Walk away	Hump
Anogenital		Tolerance	Belly
		Roll on the floor	Limbs
			Side

**Fig. A. White Fulani breed of cattle with open wound on the dorsum****Fig. B. Some yellow-billed oxpeckers (*Buphagus africanus*) on White Fulani breed of cattle**

Discussion

A close relationship exists between oxpeckers and cattle, which is believed to be mutual because they reduce ticks burden on the cattle. However, further study on the relationship showed that oxpeckers may act parasitically by reopening wounds on cattle and feeding directly on the blood of the hosts [11]. In this research, we investigated the presence and interactions of Oxpeckers' feeding behavior and body-location preferences on cattle. There was a high prevalence (87.4%) of oxpeckers infestations on cattle, establishing the existence of a close relationship and interactions between these two species which could be mutual or parasitic [12]. Among the three breeds of cattle studied, oxpeckers displayed a host preference for the White Fulani breed of cattle. We also observed that white-coloured cattle had the highest prevalence of oxpeckers infestations

which was followed by black and white colour. In a study by Ndlovu and Combrink [14], the prevalence of oxpeckers was higher in White Rhino as compared to other non-white breeds of wild animals. With high prevalence in white animals, one can speculate that oxpeckers have high affinity for white colour.

This current study revealed that oxpeckers preferred the head region compared to other body location of the cattle. The presence of skin flakes, mucous and earwax as sources of food for oxpeckers might be the major attractor. Ndlovu and Combrink [14], reported that the head is preferred since it provides additional source of food (saliva, mucus and earwax) other than ticks. However, increased feeding on the back region has also been reported due to its easy accessibility and provision of stable perch [19]. The feeding interactions between cattle and oxpeckers prove

that oxpeckers spend a significantly higher time on skin flakes. This could probably be due to the large surface area of the source of the food. The mutualism/parasitism dynamism of the oxpecker-cattle relationship may be driven by the availability of other potential food sources apart from ticks [20]. Tick feeding was not observed in this research due to routine herd treatment by the use of acaricide. The use of acaricide to control ticks makes unavailable ticks which are the main source of food for the oxpeckers. This acaricide control programme deprives them of exhibiting the ticks feeding habits. The feeding on skin flakes and other non-ticks materials must have been exacerbated by the absence or nearly absence of ticks on the cattle [11].

The prevalence of 7.9% of wound feeding interactions as compared with the prevalence of 87.4% oxpeckers infestations during the 201 observations showed that wound feeding is not the regular means of feeding by the birds. This corroborates the report of Plantan *et al.*, [11], who reported that oxpeckers only feed on wound very rarely when opportunity occurs. However, the prevalence of wound eating observed in the present study doubled that of Plantan [12], who reported 3.1% prevalence of wound eating behavior. In the current study, oxpeckers aggregate where open wounds were found as compared with other body location and exhibiting feeding activities. The aggregation around open wound might have been due to nearly absence of ticks on hosts resulting from regular ticks control programme. Recent studies have reported reduction of ticks on animals hosts as a result of acaricide use [21-23]. The wound feeding interactions observed in this study exposes hosts to further expansion of the open wounds and risk of infection. Adeyanju and Adejumo, [10], reported that oxpeckers wound feeding activities predispose cattle to secondary infection, delay wound healing and expansion of injuries. However, this was not investigated since it was beyond the scope of this research.

In this study, cattle showed high resistance behavior (89.6%) and low tolerance (10.4%). This was manifested through shaking of heads, more often than other resistance behavior including tail twitching, skin twitching, walking away of cattle, and cattle rolling on the floor which made oxpeckers depart from the cattle or change position. The resistance through head shaking is inadvertently due to the high prevalence of oxpeckers at the head region

causing discomfort to cattle. The high resistance observed is consistent with that of Diplock *et al.*, [24], but is at variance with the report of Ndlovu and Combrink, [14], who reported that large mammals including cattle, exhibit a higher tolerance for oxpeckers, which may be due to reduced agility of large-bodied hosts and/or the co-evolution of a mutualism. Diplock *et al.*, [24], reported that cattle showed high resistance to the presence of oxpeckers in order to prevent their feeding activities or allow them move to other regions of the host body.

Conclusion

There is a mutual relationship between oxpeckers and cattle which could become parasitic in the absence of the main source of food (ticks). Oxpeckers were more attracted towards white colour than other coat colours. The presence of oxpeckers on cattle does not necessarily indicate the presence of ticks on these animals since the oxpeckers-cattle relationship can change to parasitism.

Acknowledgements

The authors use this opportunity to appreciate the management of the Cattle Production Venture of Federal University of Agriculture, Abeokuta, for granting access to the farm to conduct this research.

Conflict of interest

The authors declare no conflict of interest.

Funding statements

The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

Contribution of authors

Adewale O. Talabi conceptualized and designed the research. Maryam O. Habeeb, Aderonke O. Alamu and Kemi R. Idowu were involved in the collection and processing of the data. Simon A.V. Abakpa and Adeniyi O. Egbetade critically reviewed the study. Olajoju J. Awoyomi² analyzed and interpreted the data generated

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