## **Original Research Article**

# The Indian Antelope *Nilgai*(*Boselaphus tragocamelus*)AppropriateCandidate for Domestication could add in HumanSociety

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#### ABSTRACT

The domestication of animals was part of a major transformation in the way of life of an increasing number of human societies with deep social and spiritual changes. In the present study we report about utility of Nilgai and its products values andhow it can add variety in our diet.Domestication of Nilgai may prove as anoutstanding diet (veal and juveniles) for human and domesticated carnivores it may be the most important achievements that man made in his culture history. It is very useful and has many kinds of beneficial mutualism with man exists. We also prerequisite to reconnoiter biological functions, importance and distinctiveness of products viz milk, meat, leather and body parts such as skin, teeth, nail and other product in addition to transportation and export, because of their size and powerful appearance. The meat of Nilgai is said to be lighter and milder flavored than that of blackbuck meat. Domesticated animal such as livestock play a vital role in diversified farming systems because food and recycling of nutrients through the farm are well proven. Nilgai appears to havedifferent colorwhich occurs during developmental stage, like fawn, juveniles and adults. As a matter of fact, few Nilgai showed some docility behaviorin nature subsequently that sighs of taming towards domestication. Nilgai may prove a higher status than other domestic animals when it comes to success in domestication. The Nilgai dwelling near the human habitation in proximity toa close distance in anthropogenic and share with its habitat and graze food and fodders with domestic herbivore mammals like goat, buffalos-and cow in periphery of the village's areas. The domestication of *Nilgai* corresponds to a pivotal change in the history not only of humanity

but also of the biosphere.

Key words: Boselaphus tragocamelus, Domestication, Antelope, wildlife, mammal, Blue-Bull

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#### 1. INTRODUCTION

The domestication of cattle and others species of the tribelBovinihas contributed significantly with and played a key role in the development of human civilization[1]. In the present time the Indian Nilgai(Boselaphus tragocamelusPallas) is one of the most discussed wild antelope and burning issues in agrarian society of India. During the last three decades increasing uncontrollable human population, anthropogenic activities like industrialization and urbanization are rapidly replacing natural resources, habitat, degradation of terrestrial and aquatic ecosystems and decreasing free space for wild mammals that have been exposed to serious stress which threatens their stability [2,3]. Today, agriculture is responsible for the destruction or modification of nearly 40% of the land surface [4]. All the wild species of mammals on the earth have some exclusive ecological niche &function. Nilgai is one of the most important elegant species of antelope groups. The Asiatic white footed antelope, B. tragocamelusis the largest bovidand also a biggest antelope in the world, which confined only to the Indian subcontinent[5, 6, 7]. The availability of Nilgai is reported in the sixteen states of India which is commonly known as 'Nilgai' in English "Blue Bull" locally named Ghandroze/ Nilghor in Eastern Uttar Pradesh (UP), Haryana and (MP), Roja. Bihar has become a major threat to the rural crops production pocesses processes in the entire Uttar Pradesh, Western part of Bengal, Madhya Pradesh (MP), Rajasthan, Maharashtra, Gujarat, Northern part of Karnataka, Punjab and Haryana[8, 9]. Undoubtedly in the present time Nilgai has posed a serious challenge to agricultural society and agricultural production in theentire Indian nation. But it is also fact and positive sign that nilgai is surviving and breeding the changing environment condition, indicatesmore suitable for this extreme condition, and it may be used as farm animal and adds in human society after detailed study of utility etc. It is roughlyestimated, reported, that over five lakhsof Nilgaiswere found only in six northern Indian states shows that possessions generate a vibrant association in the determination of the human. Many researchers like [10, 11, 12] reported and suspected that within a few decades we might lose most of the highly valuable farm animals' genetic resources that humans have gradually selected over the past millennia. According to [13, 14]. reported that the possible domestication occurred when humans were faced a specific need and requirement. Nilgai have been a subject of significant attraction, attention and researchable issues all over the Indian sub-continent.

In this context of background, we assessed for making an effort to report the importance & utility of *Nilgai* for domestication and may add in human society, who in turn successfully adapted in such type of extreme climate in an open unprotected area of Bihar, India.

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#### 2. METHODOLOGY

The number of KishanChaupals were attained in different blocks of the district Buxar, Bihar. Many surveys were also executed under state non plan project in different district of Bihar state by the first author. During the tenure of this visit's *Nilgai*were noticed and encountered many times and subsequently discussed with farmers regarding availability of nilgai in different ecological zone in BiharFigure-1.The observation of these wild animals was made very carefully from a close distance and behaviour of the animal were also observed according to [15, 16].





#### Fig.1. Map of study area in District Buxar, Bihar, India

Some photographs were also taken and some necessary information's were also collected through from the past history and attitudes of the people towards this stylish antelope and from the villagers those living near in the fringe area of South Bihar. The present investigation was carried out on the availability and the abundance of Indian nilgai in South Bihar from January 2018 to December 2019. The study area falls under the agroclimatic Zone III A&B, where the Zone III B is characterized by typically hot and heavy rain and also characterized by extreme high and low temperature during summer and winter respectively.

### 3. RESULTS AND DISCUSSION

Wildlife possessions create a vibrant association in the persistence of the human species and have been a subject of considerable attraction, attention and researchable issues all over the world. Some scientist even consider that truly wild nature (pristine zones from human impacts) does no larger exist on earth [17]. The anthropogenic pressure in response to climate change have brought significant change in fauna and flora [18]. [19] proposed to assign the term 'Anthropocene' to the present geological epoch, supplementing the Holocene, one human have become an important geochemical force and perhaps the dominant ecological force on the

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planet. The Anthropocene era could be said to have started in the late eighteenth century [19].In the present scenario of climate changes, the agroclimatic condition kept on uncongenial and forest became very thin. Over these Shahabad (Bhojpur, Rohtas, Kaimur and Buxar)areas the ambient temperature rises up to 45<sup>o</sup>C during summer (May-June) & winter starts towards the middle of October and during January-February, temperature drip down to 4 <sup>o</sup>Creported by [20]. The *Nilgai* have been considered a pest in several north Indian states as they ravage crop fields and cause considerable damage [21]. The many Indian states already proposed and some are declared this graceful wild antelope animal as vermin and ordered to kill them in favors of farmers. As per record total 2,228 numbers of *Nilgai* were killed by professional shooter during 2017-2018 in different districts of Bihar[22, 23], detailsare presented in Table 1.

#### Why the nilgai isn't the problem

Most of the Indian states are facing this situation today that the wild animal (*Nilgai*)becoming the problem.Our recent study reports reported aimed at its habitat loss, deforestation and developmental work like industrialization and urbanization has been driving and forced *Nilgai*into the crop fields and human dwellings in search of food in taming condition [24]. For instance, about 7 to 11 million Km<sup>2</sup> of forest have been lost in the past 300 years due to land use activities, primarily for agricultural expansion and timber extraction [4]. Another region is declining population of predators such as tigers and leopards lead to a consequential rise in population of *Nilgai*. An unfavorable condition like natural calamities such as drought affect human beings equally feasible in the case with wild animal like *Nilgai* also. Similarly, drought dries up availability of food for foraging driving wild animals into nearby crop fields and human habitat dwellings in search of food and later develop a two-way partnership with human [24, 25]. Climate has played a major role in shaping the human culture and in turn domestication of plants and animals are also affected by the same cause that the men exploited this situation to his favor and there afterstared domestication, as well [26].

#### Need to understand population dynamics

The time has arrived for a nation-wide policy framework to manage and to overcome humannilgai conflict. Scientific management of *Nilgai*should necessarily involve population control. In the mean while a member of research has gone into this thematic areabefore we can reproductively control the population of *Nilgai*. First, we start with better scientific management policy for *Nilgai*must be adapted to the population dynamics of the wild animal and be region specific. So, unless we study the long-term population dynamics of wild animals, we cannot decide whether culling could solve the problem of conflict or not. The problem might be something completely different than population rise.

Table 1. Impact of Nilgai(BBoselaphus-tragocamelus)in six northern states of India

Sl. no	State name	Impact		
1	Bihar	Nilgai is found in most of the districts of Bihar but the maximum crop		
		damage has been reported in different district like Kaimur, Buxar,		
		Bhojpur, Vaishali, East ChamparanSupaul, Nalanda and Patna. The		
		Govt, of Bihar declared nilgai as a Vermin in 2015, and over 2828		
		numbers of Nilgaiwerekilled during 2017-2018		
2	Uttar	In the Uttar Pradesh its population was reported to the turn of 2.3 lakh		
	Pradesh	Nilgais and itaccounts India's largest population. Attempts to cull it		
		since 2013 but have failed. There is already a huge black market for		
		Nilgai body parts such as skin, teeth, nails and meat.		
3	Madhya	This state was also severely affected by nilgai; 3, 278 cases of crop		
	Pradesh	damage were reported between 2009-13, and Rs 1.2 crore was paid in		
		compensation. Name was changed to Rozafor allowing them to be		
		killed by the state govt. (India Today, 20 <sup>th</sup> June 2016).		
4	Maharashtra	Maharashtra has also reported crop damage by the Nilgai and the govt.		
		has allowed the farmers &licensed firearm holder to kill Nilgai.		
5	Rajasthan	State considering shooting them with contraceptive darts		
6	Haryana	A large average of crop damage was reported in different district like		
		Sirsa, Hissar, Bhiwani, Rohtak and Mahendragadh. The State h		
		proposed to the changing name to Rozawith the of permission for its		
		killing.		

### Changing Behaviors and Habitats:

The *Nilgai* are adapted for survival on open agricultural field and prefer areas like short busses and scattered trees, but now a-daysfrom two or three decades they are found in commonfield and near the human habitation, villages areas also. The Indian *Nilgai* wasprotected under schedule III of the Wildlife (Protection) Act, 1972, and Delhi honoured it as their state animal. *Nilgai* is also categorized as an animal of "Least Concern" under the International Union for the Conservation of Nature and Natural Resources (IUNC), [14]. The *Nilgai* is one of the most stylish antelope species in India. It appears in different color during its growth and developmental period of different stages like fawn, juveniles and adult. It is also reported as being a fast along with swift-moving runnerin nature and much more diurnal in their habits than a deer. [27] suggested that *Nilgai* exhibits substantial behavioral plasticity in response to different nature and levels of risks faced in the habitats. [28] reported behaviour of wild animal Comment [U6]: Pest?

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is probably the first to have been modified during domestication. In the changing scenario of demographic and ecologicalniche regarding present stress situation, its (*Nilgai*)behavior has also been changed and it started movingfor food near human habitation during dusk period and feed along the night andreturning come back early morning to the dwelling same space [23].



a. Nilgai in urban areas near Patnab. Female Nilgai in HCBF, Dumraon



c. Nilgai siting &standing in pulses Cropd. Veal Nilgai grazing cultivated grass



e. *Nilgai* grazing in HDFC Farm, Dumraon f. Nilgai grazing with domestic animal Figure: 2. a.b.c.d.e.f. *Nilgai* in different conditions and locations Nilgai looking in glorious colour and sized Formatted: Font: Italic

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The Indian *Nilgai* prefer to eat the green and fresh vegetation and is also found of some crops as more favouritefor *Nilgai* e.g. pulses, millet, maize, sugarcane, even tender leaves of paddy and wheat, various vegetable crops like cabbage, cauliflower, spinach, beans, lady's finger, brinjal, cucumber, pumpkin, gourd, muskmelonete. During the course of study, *Nilgai* underwent considerable change and share habitat with blackbuck and domestic animals like cow, buffalos, goats and others-ete. The most important changes were observed like their appearance can be noticed in their attractive and glorious colour and size with special reference to females & juveniles, Figure:(2. a.b.c.d.e&f). Docility behavior were reported regarding feeding pattern shows that the adult females graze with juveniles and dwelling near the human habitation in proximity of in a close distance in anthropogenic environment [24]. It also grazes and share food and fodders with domestic herbivores mammals like cow, goat, and buffalo in periphery of village areas. [29] reported that the *Nilgai* can withheld tolerable interference by others livestock's and more importantly the degradation of vegetation caused in its habitat was found better than deer. [30, 31] reported regarding behavioural changes shared by all domestics, is their's tolerance of proximity to people.

#### Importance and status

Entire herbivore animals are more or less protagonisttaking part in agricultural systems. Domesticated animals such as livestock also play a vital role in diversified farming systems, because their products become food and other value-added produces and recycling of nutrients through the farm preparation as well. History of domestication is uncertain and dates back to thousands of years with human civilization. Almost all the worlds domestic animals originated in Asia. As per the record only 20 large sized wild animals in the world have been domesticated to provide food leaving almost more than 200 species of large herbivores animals which have not been domesticated till now [32]. Domestication began started with goat and sheep in the near East and what is now Iraq soon after the end of the last ice Age and it was well established by 7000 BC. Over the next few thousand years the process continued, till 2000 BC, the details are presented inTable -2.

During this stipulated period all the main modern domestic species except deer were established htt://arcaeological.about,com. *Nilgai* is wild animal, attacking human habitation only at the cost of human's interact i.e., encroachment areas of wildlife for developing their own habitat. As a result, it has been causing huge economic damage of the poor's farmers agricultural field of the society. It is fact that most of the people of Bihar are dependent on agriculture. Out of several kinds of wild animals present outside the protected area, one animal blue bull has been

**Comment [U9]:** Also use the scientific name. Some products may have different names in other countries or regions destroying agricultural crops of the people on large scale and has become a menace [22, 33]. While in Bihar, blue bull has been declared as vermin and allowing them to shoot for some period. Biological steadiness merely cannot be reestablished through the barrel of a gun. The killing of wildlife causes tremendous suffering and opens the door to the illegal wildlife trade. There is already huge black market for *Nilgai* body parts such as skin, teeth nail and meat in India especially in Uttar Pradesh,[22].

Table 2. History of wild mammalian domestication in different period in world

S.	Wild	Domestic	Years	Country	Purpose	
<b>N.</b>	mammal		( <b>BC</b> )	name		
1	Wolf or	Dog	18,000-	East Africa	Pet, cohort	
	Jackal		10,000			
2	Wild Goat	Goat	9,000-	Iran	Food, milk and clothing	
			8,000			
3	Mouflon	Sheep	10,000-	South west	Food, milk, wool and clothing	
	and		8,000	Asia		
	Asiatic					
	Urial					
4	Wild boar	Pig	9,000-	China	Food, milk, sport, and clothing	
			8,000			
5	Auroach,	Cattle	8,000-	India middle	Agriculture purpose, meat, leather	
	long horn		7500	east, sub-	and religious region	
	wild ox			SaharaAfrica		
6	Wild	Horse	4,000- Eurasian		Transportation and meat	
	horse		3,500	steppes		
7	Wild	Buffalo	3500-	India china	Agriculture purpose, Milk and	
	buffalo		3000		meat.	
8	Wild	Camel	4000-	Iran and	Agriculture purpose and	
	camel		3500	Turkmenistan	transportation	
9	Wild	Elephant	2500-	India	Transportation	
	elephant		2200			
10	Wild	Why not	Nilgai is may be		Agriculture,milk,	
	Nilgai	Nilgai <mark>?</mark>	promising	candidate for	meat, <b>B</b> <u>b</u> ioenergy,transportation,	
			domestica	tion &could	foodeteand others.	
			add variety to our diet			

Source:htt://arcaeological.about,com

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India, is already suffering from serious effects of climate change especially global warmingalter the rainfall pattern and droughts. These all factors certainly hurt farmers livelihood first. Focusing on long term human solutions to the conflict as we humans have created the situation with animals by stealing their homes. It now needs focus on protecting what's left of the animals; theirs natural homes also it will ultimately benefits farmers and all of us. Silviculture based cropping system help manage the earth's climate and their destruction by released restricted carbon into the atmosphere contributing to the eco-friendly climate and also regulate rainfall. Due to growing population and area expansion in agriculturethere increases many folds in the number of grazing livestock which leads realized us to focus on development of projects through are putting fragmentation pressures on natural habitats and also increasing the incidence of conflicts between wildlife and humans[34]. In view of the aforesaid context, it is felt and thought that there is an urgent exclusive programme forwell-beingof farmers and improve economies of farmers and minimize damage to both humans and wildlife.

Sl. No.	Reputation	Gorgeous	
1	Large antelope	The large size reduces our harvesting &processing cost	
		and tolerable interference with livestock's, degradation	
		of vegetation in its habitat. Male slightly larger than	
		female.	
2	Exhibited social	Females and juveniles are always together. They live,	
	structure	graze and sit together in a group as its exhibited social	
		bond. They also graze with domestic animals.	
3	Quick growth rate	<i>Nilgai</i> become sexually mature by two years, this	
		haturing rate compared to the numan me span allows	
		an acceptable duration of care taking.	
4	Females and juveniles	Allows us to offer its meat at very attractive price and it	
	very prominent	is very flexible in its requirements.	
5	High reproductive rate <i>Nilgai</i> produced regularly more than one offsp		
		year and beneficial for income generation.	
6	Much like veal	The meat has a mild pleasant flavor with a good	
		texture& taste as well.	
7	Extremely contain very	Averaging well under extremely low fat 1 % for most of	
	low fat	the cuts, it may be a promising endeavor and could add	
		variety to our diet. (Kye, Russell, 1990)	
8	Flexibility in diet and	Nilgai having both browser &grazer. They prefer food	
	habitat tolerance	like grasses, herbs and wooden plants. They do not drink	
		water regularly even in summer, can survive for long	
		period without water, it's comfortable for domestication.	
9	The Generic name is	"Bos" come from Latin word means ('cow' or 'ox'), it	
	<b>Boselaphus</b> combination	also lookslike cow. "Elaphos", come from Greek word	
	of two-word Bos +	means (deer), some behavior is similar to that of deer	

Table 3.	The	Indianantel	lope <i>Nilgai</i>	is an idea	lcandidate i	n many ways.

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	elaphos	special four horned antelope.				
10	The specific name	"Tragos" means (he-goat) and "kamelos" means	<			
	tragocameluscome from	(Camel), it is cleared that Nilgai having very nearest				
	join of two Greek word	family to goat and camel also, so its meat and others				
	tragos + kamelos	body parts are very useful for human well-being in				
		future.				

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The Indian Nilgai may be useful in various ways we prerequisite to reconnoiter their biological functions, importance and distinctiveness of added products viz-milk and flesh of nilgai body parts such as skin (hides), teeth, nail and meat as reported in Utter Pradesh and their adjoining areas. Blue bull flesh is highly in demands in the foreign countries it may be exported after domestication and also add in the agrarian society. As a matter of fact, Nilgai is agricultural pest in India but it occurs rare in Nepal and Pakistan [35]. The major reason behind its decimation in these two countries and extinction in Bangladesh are extensive hunting, deforestation and habitat degradation in the 20<sup>th</sup> century. [36] reported that Nilgai was not widely hunted until the 20<sup>th</sup> century when habitat degradation and poaching become extensive. [37 38,39] reported regarding the meat of Nilgai is said to be lighter and milder flavored than that of blackbuck meat. The Indian Nilgai has many qualities to recommend it for its domestication. Nilgai is both browser and grazer or mixed feeders, it prefers grasses and herbs, though they commonly eat woody plants in unfavorable condition [29]. The female Nilgai regularly produce more than one offspring and it is very flexible in its requirements. The white footed antelope may be ideal candidate for domestication and could add in agrarian society of India, details are presented in Table-3. Undoubtedly, most of the large herbivoure's animals are virtuous to eat as socially and culturally restriction, so why do we twig through cows, sheep and pig?. Why not Nilgai domesticate?In present stress condition, it has been seena dramatic improvement towards altering behavior in Nilgai with changing climatic and demographical present scenario in Bihar. Nilgai following commensal or prey pathways tends to possess more traits that make them promising candidates for domestication. [30] reported conversely species on directed pathways likely possess barriers to domestication that require more knowledge on the part of humans to overcome. There is very little knowledge about the characteristics and utility of this animal where detailedstudy on various issues could be utilized in future. This could make it a much better choice for farming than the red deer. The purpose of domestication of animals since ancient times was felt needed based on mutual benefits and symbiotic relationship.The provisions to allow wild/ neglected animals to kill them can be misused and against the wild life Formatted: Font: Italic

protection act nationally and internationally. Cervus elaphus, the most highly regarded of the new domestic animals.[40] also reported regarding domestication corresponds to a pivotal change in the history not only of humanity but also of the biosphere.

#### **4.** CONCLUSION

All those above situations force us to think about its farming and *Nilgai*may be domestication for the purpose of uniqueness of its milk and meat and other bio-molecules for therapeutic usein export-oriented market eteand commerce. So, we need to explore their studies in the quantitative and qualitative parameters of their products well supported by their phenotypic & genotypic as well as molecular characterization for proper utilization in future under an appropriate form of economic management. The Indian *Nilgai* may be promising candidate for domestication and could add in agrarian and human society and as series of several varieties to our diet.

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