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Determine The Age in Male Gazelle (*Gazella Subguttrosa*) By Using New Formula

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Abstract

Horns in 64 male gazelles (*Gazella subgutturosa marica*) (40 live males and 24 dead males) were examined and followed up. The number of rings of horns every year was determined and compared with dentition profiles and birth records, which were bred in government and private protectorates in Anbar province, Iraq, for the period between 2010 and 2020. Results show male gazelles are born without horns. At the first six months of age, three rings will appear in each horn. Male gazelles, when they reach one year old, will have nine horn rings. After the ninth rings, we can count three rings for each year, respectively, so in 2nd year olds we can count 12 rings, in 3rd year olds 15 rings, in 4th year olds 18 rings, and in 5th year olds 21 rings. The results of this study indicate that there is a relationship between age and the number of horn rings in *Gazella subgutturosa* males, and we can use this to determine the age.

Key words: Zella, Horn, Rings, Age

Introduction

According to the last report for the International Union for Conservation of Nature (IUCN), *Gazella subgutturosa* is a globally vulnerable (VU) species listed in the Red List assessment whose current population trend is decreasing (IUCN).

Age determination plays a main role in wildlife management and conservation works because it helps improves the quality of data on population patterns, growth rates, sexual maturity, fertility ratio, life span, age-related mortality rates, as well as social behaviour (Craighead *et al*., 1970; Spinage, 1973; Karanth, 2003; Kerley *et al*., 2003). The age distribution of a population can also provides guides about population growth and stability, as well as their impact on population features and ecological patterns (Krebs, 1999; Williams *et al*., 2002). In addition, studies like genetics, diseases, evolutionary ecology, life-history planning, and ecosystem components need information on age-related criterions (Gaillard *et al., 1994*; Bingham & Purchase, 2003). Details of

age are considered critical information for administrative solution and wildlife conservation plans, especially for species that are threatened or at risk of extinction, such as gazelles (Armstrong & Seddon 2008). There are many studies related to age determination in wild animals that used different methods to determine the age, like tooth replacement and wear (Foley et al., 2022), tooth eruption (Munro *et al*., 2009), dental cementum annuli (Veiberg *et al*., 2020), X-rays (Simon & Frydendall, 1981), the length of the telomere (Haussmann & Vleck, 2002), and DNA methylation (DNAm) (De Paoli-Iseppi *et al*., 2017). There are few studies that deal with the horns of gazelles, and most of these studies focus on the length or shape of the horns (Wronski and Sandouka 2010; Schreiber 2022).

This study aimed to determine the age in male gazelle (Gazella subguttrosa) by using new formula.

Materials and Methods

The growth of horns in 64 male gazelles (*Gazella subgutturosa marica*) was examined and followed up; the number of rings of horns every year was determined and compared with the dentition profile and birth records. The distribution of these males was as follows: 40 live males and 24 dead males as a result of health and management problems that bred in government and private protectorates in Anbar province, Iraq, for the period between 2010 and 2020.

Results and Discussion

Male gazelles are born without horns (Fig. 1), and this applies to females as well. The horns in males begin to grow and differentiate with time more than in females. Horn rings start to grow and differentiate more with time.

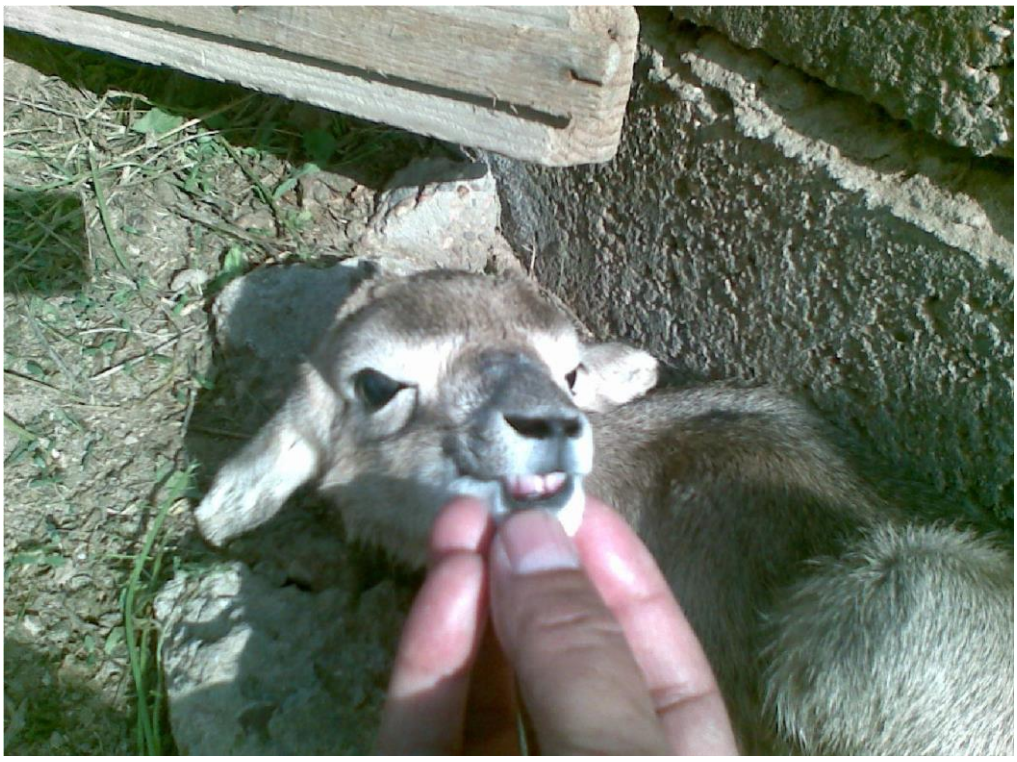

Fig.1. male gazelle 1 day age, with no horns At

the first 6 months, age 3 rings will appear in each horn (Fig.2).

Figure 2. male gazelle 6 months age, noticed there were three rings in each horn.

Male gazelle When we reach one year old, we will have nine horn rings (Fig. 3), and then after the ninth rings, we can count three rings for each year, respectively, so in 2nd year, we can count 12 rings (Fig. 4), in 3rd year, 15 rings (Fig. 5), in 4th year, 18 rings (Fig. 6), in 5th year, 21 rings (Fig. 7) …etc., according to the results summarized in table 1.

Figure 3. male gazelle 1 year old (9 rings)

Figure 4. Male gazelle 2 years old(12 rings)

Figure 5.Male gazelle 3 years old(15 rings)

Figure 6. Male gazelle 4 years old(18 rings)

Figure 7. Male gazelle 5 years old (21 rings).

Table 1. Number of horn rings per year

Age (year)	0.5	1	2	3	4	5	6
Horn Rings No.	3	9	12	15	18	21	24

Discussion

Determine the age of *Gazella subgutturosa marica* by using different morphological features, which will be more accurate and would support wildlife protectors and scientists in determining sex ratios and accordingly help manage free-ranging populations that cannot easily be approached (Cunningham *et al.,* 2011). Many studies have referred to the lifespan of male gazelles not exceeding 7 years in captivity (Zhevnerov & Bekenov, 1983; Cunningham *et al*., 2011). Kingswood & Blank (1996) mention that the new-born calf has funnel-shaped curls of hair at the site of future horn development; these agree with the results of our study.

Many studies referred to the relationship between horn growth and age, but most of these studies dealt with length and measurement of horns. According to Jeffery & Hanks (1980), growth in horn length was a suitable criterion for the age determination of eland *Taurotragus oryx.* Cunningham *et al*. (2011) used horn length as one of the most useful properties to use for age determination in *Gazella subgutturosa* in the field. Gurler *et al*. (2015) also discussed horn length to describe the gazelle population in Turkey.

Few studies have referred to horn's rings and their relationship with age or described them; most studies just describe horn's rings as horn characters in gazelles (Dookia & Goyal, 2007; David *et al., 2010*; Kingdon & Hoffman, 2013).

We can say that the closest study related to this subject was done by Zhu *et al.* (1992), which mentioned there were 3–4 convex ridges in horns every year, and these results disagree with ours. This is because Zhu *et al*. (1992) relied on samples of skulls and didn't depend on live animals or direct investigation as in our study, which relied on most samples of live animals and continued for several years.

Conclusion

The results of this study indicate that there is a relationship between age and the number of horn rings in *Gazella subgutturosa* males, and we can use the formula mentioned in Table 1 to determine the age.

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