

Termination of Unwanted Pregnancy in Himalayan Tahrs (*Hemitragus jemlahicus*) and a Saanen Goat (*Capra hircus*)

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Abstract : A female Saanen goat was pregated by a Markhor (*Capra falconeri*) and three Himalayan tahrs (*Hemitragus jemlahicus*) were mismated by a conspecific male at Seoul zoo. Cross-breeding whether intentional or unintentional is considered opposite to the primary rule of species conservation. The Markhor, imported in October, 2002, having the number of chromosomes ($2n = 60$) same as domestic goats accidentally mated with a Saanen goat. The mating time was back-calculated on the basis of zookeepers' record. The Saanen and three Himalayan tahrs ($2n = 48$) were successfully aborted by intramuscularly injecting 15mg $\text{PGF}_2\alpha$ (dinoprost tromethamine).

Key words : abortion, Himalayan Tahr, Markhor, pregnant, Saanen.

Introduction

The Markhor (*Capra falconeri*), Himalayan tahr (*Hemitragus jemlahicus*) and Saanen goat (*Capra hircus*) are classified in the phylum Chordata, subphylum Vertebrata, class Mammalia, order Artiodactyla, family Bovidae, subfamily Caprinae. The Markhor is officially the national animal of Pakistan and protected as an endangered species by IUCN (International Union for the Conservation of Nature and Natural Resources). The only male Markhor at Seoul Zoo, living without female counterparts, accidentally mated with a dairy goat, Saanen at Seoul zoo. The gestation periods of the Saanen goat and the Himalayan tahr are 5 and 7 months, respectively. Unlike canids and felids, the caprine placenta produces little or no progesterone (8,12). The domestic goats were well known to be critically dependent on functional corpora lutea to maintain pregnancy (2,7,13). In other words, as the corpus luteum lost its presence, the state of pregnancy is terminated. In domestic does, it has been widely reported that $\text{PGF}_2\alpha$ is most effective, and case studies have gone as far as to document how long it takes to take effect as well as total dose cost for effective fetal discharge (2,4,9,10,13). The objective of this study is to confirm that 15 mg $\text{PGF}_2\alpha$, a dosage commonly used in domestic goats, is proper to wild goats and finally to reduce hybrids produced accidentally by mismating at zoos. To our knowledge, this is the first report to use a luteolytic agent to abort wild goats, specifically, Himalayan tahrs and a domestic goat involved with a Markhor in Korea.

Case

A multiparous Saanen, 3-year-old, weighing 35 kg was accidentally mated with a male Markhor late October in 2008. Three Himalayan tahrs, 4-year-old, weighing 43 kg, 48 kg and 38 kg, was pregated by a male Himalayan tahr in November, 2008, during their local breeding season.

For preventing cross-breeding and extending genetic diversity, it was decided to terminate the pregnancy of these animals.

In the termination of the pregnancy of the Saanen goat, the serum concentrations of estradiol and progesterone before $\text{PGF}_2\alpha$ treatment were 45.8 pg/ml and 12.5 ng/ml, respectively (Fig 1). The analyses of sex hormones were performed based on the method of Time-Resolved Fluoroimmunoassay (TR-FIA) (19,20). About 3 ml of blood samples were collected by jugular venipuncture from March 4 to 18. The pregnant Saanen was intramuscularly injected with 15 mg (3 ml) $\text{PGF}_2\alpha$ (Lutalyse[®], Pharmacia & Upjohn, Belgium) on Mar 4, 2009. Two fetuses, a male of 1.25 kg and a female of 1.0 kg, were expelled less than 40 hours later (Fig 2) and the level of progesterone dramatically decreased right after $\text{PGF}_2\alpha$ injection (Fig 1).

Three Himalayan tahrs were assumed to get pregnant in their breeding season of late November. The serum levels of estradiol and progesterone were checked on April 30, 2009, before injection of 15 mg (3 ml) $\text{PGF}_2\alpha$ on May 15, 2009. Each level of estradiol and progesterone was 34.1, 31.8, 29.1 pg/ml and 7.54, 7.91, 12.78 ng/ml, respectively. The tahr of which the level of progesterone was 12.78 ng/ml aborted 45 hours after injection of $\text{PGF}_2\alpha$. The other two tahrs were considered that abortion cost more than 52 hours. The female tahrs had been healthy enough after abortion to participate in transcervical artificial insemination of frozen-thawed semen in July, 2009.

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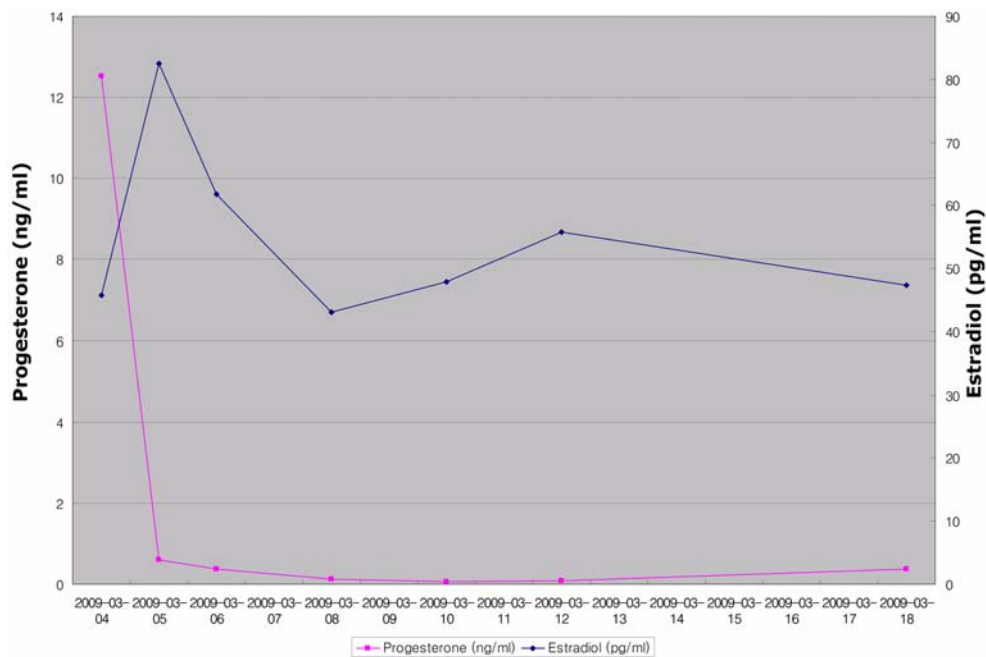


Fig 1. Changes of serum estradiol and progesterone after administration of $\text{PGF}_2\alpha$ in a Saanen goat.



Fig 2. Aborted fetuses (A) and the vaginal region of mother Saanen after abortion (B).

Discussion

$\text{PGF}_2\alpha$ is effective in terminating pregnancy from day 4 until term because the doe is CL-dependent throughout gestation (21). But corticosteroids and estrogens have also been used for this purpose (5,6). According to the dose of administered $\text{PGF}_2\alpha$ intramuscularly on days 140 to 144 of gestation, the delivery time of live kids are different, but the higher the dose of $\text{PGF}_2\alpha$ administered, the more accurate the delivery time that can be predicted (1,3,4).

Few reports had been known about drug of choice, doses and the effectiveness of its use when does were mismated with heterospecific males, especially by wild goats (5-7).

In this study, we used 15 mg $\text{PGF}_2\alpha$ to induce abortion. Progesterone concentration dramatically decreased 24 hours after injection (4) (Fig 1). Two fetuses were expelled about 40 hours after injection of $\text{PGF}_2\alpha$ that is in the range of 36 to 56 hours (1,21).

$\text{PGF}_2\alpha$ and its analogues have also been used for estrus synchronization, induced parturition and abortion in ungulates and carnivores (8,10-18). Compared to goat species that entirely rely on luteal production of progesterone throughout pregnancy, sheep species instigate placental synthesis that supersedes ovarian production within the first trimester of pregnancy (21). It means that wild sheep like mouflon, bighorn sheep and Dall sheep must be considered in determining the right time of $\text{PGF}_2\alpha$ administration for induced parturition and abortion.

Himalayan tahr (*Hemitragus jemlahicus*) is a representative ungulate species that was imported to USA and New Zealand where the species was successfully settled down in foreign countries now having shown the economical value of hunting trophies by tourists. Even though it is a species of wild goat, very little information about the length of breeding season, estrous cycle, ovulation and fertilization has been previously documented. Similarly, the drug of choice and its dose

for induction of abortion were also unknown. Normally these animals breed late November to early January in Korea. Before intramuscularly injecting 15 mg PGF₂α to three Himalayan tahrs, the levels of progesterone were 7.54, 7.91 and 12.78 ng/ml. The durations cost until abortion were 45 hours for two tahrs of which progesterones were 7.54 and 7.91 ng/ml, and 52 hours for a tahr of which progesterone was 12.78 ng/ml. The gestation period might affect time that cost until abortion in Himalayan tahrs.

For all we know, this is the first report of terminating unwanted pregnancy of Himalayan tahrs and a Saanen goat mated by a male tahr and Markhor, respectively.

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히말라안타알 및 자넨염소의 원치 않는 임신의 종절

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요 약 : 서울동물원에서 자넨 염소가 마퐁에 의해 임신이 되었고, 세 마리의 히말라안타알이 같은 종의 수컷에게 잘못 임신이 되었다. 의도적이던 우발적이던 다른 중간에 번식을 시켜 잡종을 생산하는 것은 종보전의 근본적인 원칙에 위배된다. 2002년 10월에 수입되었으며 염색체수가 염소와 같은 60개를 가진 마퐁이 우연히 자넨과 교미를 하게 되었다. 사육사들의 기록을 토대로 교미날짜를 추정하였다. 히말라안타알 3수와 자넨은 PGF₂α 제제 (dinoprost tromethamine) 15 mg을 근육주사하여 성공적으로 유산을 시켰다.

주요어 : 유산, 히말라안타알, 마퐁, 임신, 자넨.