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Description of the External Genitalia and Uterus of a 24-month-old Freemartin Hanwoo

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Abstract

We observed the external genitalia and uterus of a 24-month-old freemartin Hanwoo. The vulva was smaller than observed in a normal female Hanwoo, while the clitoris was larger in the freemartin. The angle between the external genitalia and the perineum also varied. Upon internal genital examination, the uterus of the freemartin was a thin tube approximately 18 cm in size and had not differentiated into a normal uterus and uterine horns.

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INTRODUCTION

Freemartinism occurs when vascular anastomoses form between the placentae of developing heterosexual twin fetuses (Padula, 2005; Mendes, 2012; Remnant *et al*., 2014). Freemartinism is most frequent in cattle, and less common in other species (Padula, 2005). A freemartin calf's external genitalia usually appears female and they are commonly raised as female. However, the calf's internal genitalia is masculinized to some degree and they are infertile (Padula, 2005; Mendes, 2012; Remnant *et al*., 2014). In cattle, the incidence of freemartinism has been reported to range from 80 to 97% in females born with a male twin (Padula, 2005; Mendes, 2012). Thus, in all female/ male calf twin pairs, the female calf is presumed to be freemartin until they can be diagnosed (Mendes, 2012). In addition, single-born bovine freemartins have also been reported, which is suspected to result from in utero death of a male co-twin (Padula, 2005; Mendes, 2012). The infertility of freemartin cattle can be a concern to owners. Particularly on dairy farms, a freemartin has little economic value because it cannot produce calves and milk. On Hanwoo farms, females are raised for calf production, for which freemartins have no value. A number of studies have been conducted on the diagnosis of freemartinism. Several diagnostic methods such as clinical examination, karyotyping, blood grouping, detection of Y-chromosome DNA, fluorescent in situ hybridization, and hormonal methods have been developed (Padula, 2005). In Korea, when a female calf born as a heterosexual twin does not showed symptoms of estrus and the uterus cannot be palpated via rectal examination, it is declared a freemartin.

However, it has been reported that the external genitalia of freemartin heifers show a different pattern from normal females. A small vulva, long and coarse vulval hair, and an enlarged clitoris are commonly found, as well as different angulation of the vulvar area; urine may also spurt upward when the animal urinates (Padula, 2005; Mendes, 2012).

The internal genitalia of freemartin have been reported to vary from near normal to male-like (Padula, 2005; Mendes, 2012). In addition, in freemartins it has been reported that the uterus is not well developed or that the uterine horns may be shorter

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than the uterine body and cervix (Mendes, 2012). The vagina of a freemartin is shorter than that of normal female cattle and commonly is non-patent or blind, with the cervix absent (Mendes, 2012).

Many reports have described the internal and external genitalia of freemartin cattle. In Hanwoo, freemartinism often occurs in heterosexual twin births, but few reports have been published. Therefore, in this report, we observed the external genitalia and uterus of 24-month-old freemartin Hanwoo.

CLINICAL CASE

A Hanwoo cow gave birth to heterosexual twins in the 9th calving number. The weight of the calves at birth was 17 kg and 11 kg for the male and female, respectively. The female was confirmed to be freemartin because the uterus could not be palpated at the age of 15 months. Before slaughter at 24 months, we observed differences in the external genitalia between the freemartin Hanwoo and a normal female Hanwoo of the same age.

The vulva of the freemartin Hanwoo was smaller than that of the normal Hanwoo, and the perineum angle varied significantly (Fig. 1). In addition, the clitoris of the freemartin Hanwoo was larger (Fig. 2). Observation of the uterus and connected external genitalia after slaughter revealed that the vaginal length was very short (about 5 cm, red straw) and we confirmed that the urethra connected to the bladder at the lower lateral part of the vagina (yellow straw; Fig. 3). The cervix was not well developed. The uterus of the freemartin Hanwoo was a thin tube about 18 cm in length (Fig. 4). The uterus did not exhibit a lumen, and the uterine body and uterine horns could not be distinguished. Ovaries were not found in the anterior part of the uterus. Two parallel tubular structures were observed on both sides of the uterus (Fig. 4). Previous reports suggested that remnants of the Wolffian duct may appear as discontinuous, tubular structures at the caudal part of the female genital tract [3]. Therefore, in this freemartin Hanwoo uterus sample, the two parallel tubular structures on both sides of the uterus were suspected to be remnant Wolffian duct.

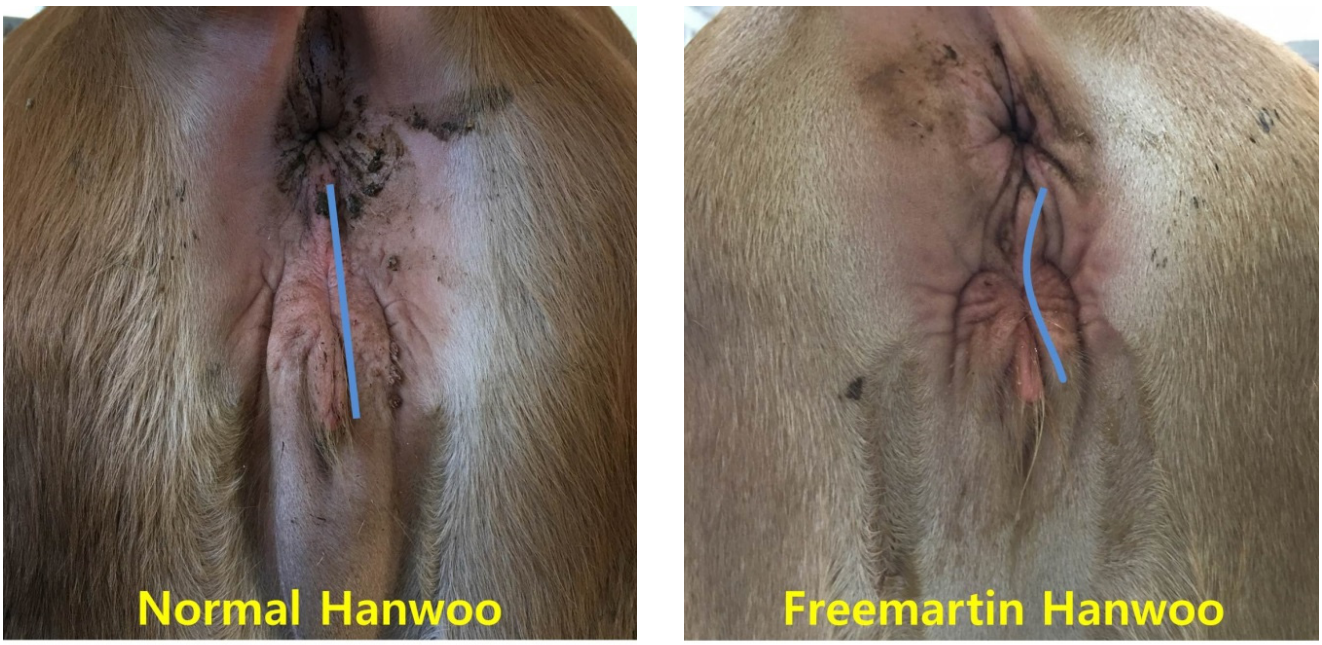

Figure. 1. External genitalia and perineum angulation in a normal female Hanwoo and a freemartin Hanwoo. The vulva of the freemartin Hanwoo was smaller than that of the normal Hanwoo, and the perineum angle of the freemartin Hanwoo also varied from that of the normal Hanwoo.

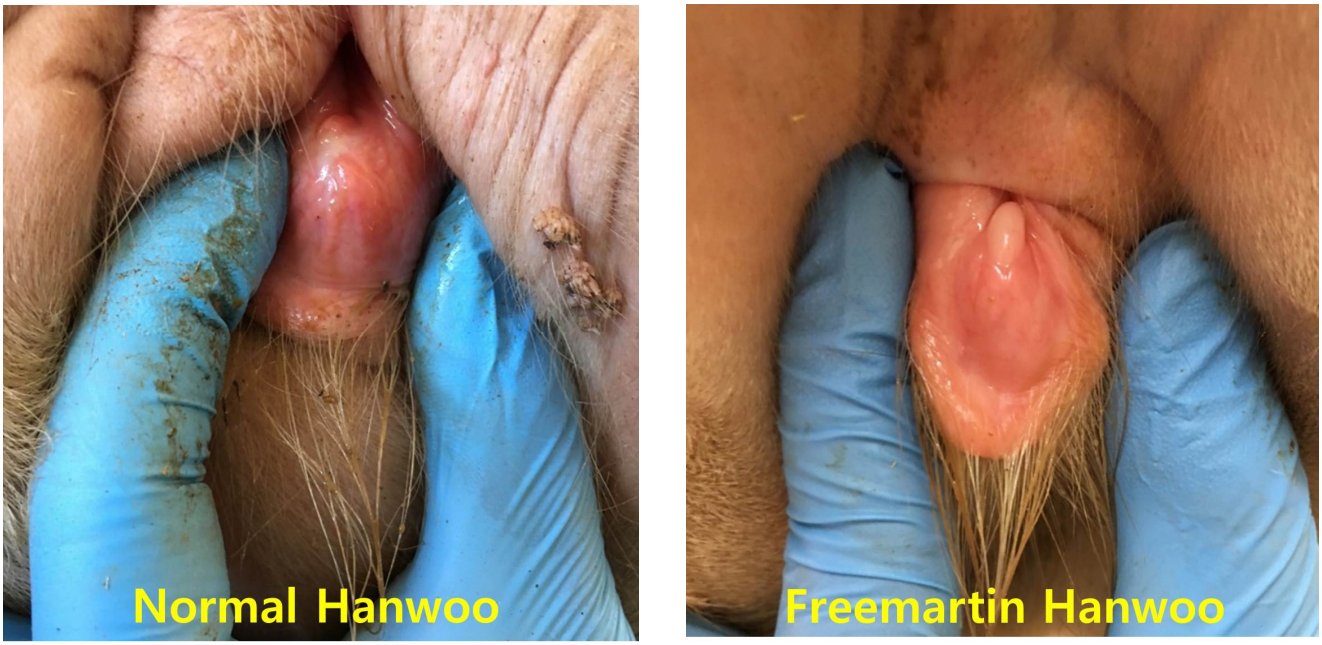

Figure. 2. The shape of the clitoris in the normal Hanwoo and freemartin Hanwoo. The clitoris of the freemartin Hanwoo was larger.

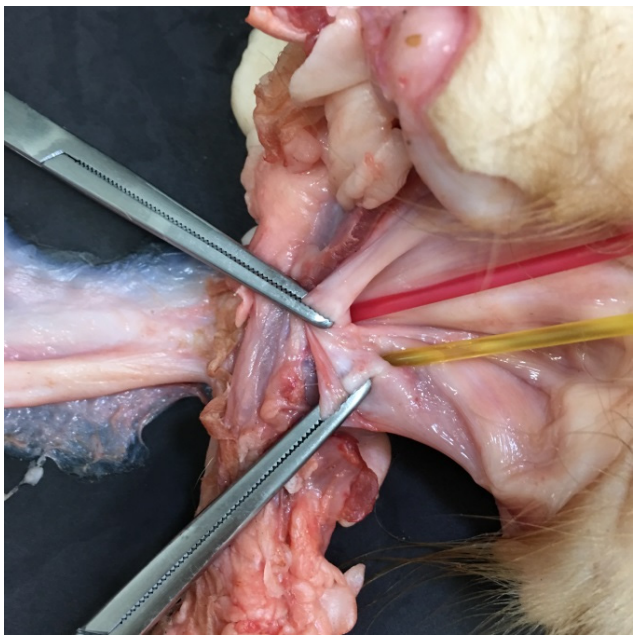

Figure. 3. The orifice of the vagina and urethra in the freemartin Hanwoo. The vaginal length was very short (approximately 5 cm, red straw) and we confirm the urethra was connected to the bladder in the lower lateral part of the vagina (yellow straw).

Figure. 4. The reproductive organs and bladder of a freemartin Hanwoo. The uterus of the freemartin Hanwoo was a thin tube. The uterus did not exhibit a lumen, and the uterine body and uterine horns could not be distinguished. Ovaries were not found in the anterior part of the uterus. Two parallel tubular structures were observed on both sides of the uterus.

DISCUSSION

Based on previous research and this report, observation of external genitalia is important in the diagnosis of freemartinism. We also observed that the internal genitalia, including the uterus and ovaries of freemartin Hanwoo, were not normally developed. The internal genitalia of freemartin cattle have been described to take a variety of forms (Mendes, 2012) and the internal genitalia of the freemartin Hanwoo is also considered to be very diverse. Therefore, the results of this report cannot be broadly representative of the internal and external genitalia of all freemartin Hanwoo. Further research on the occurrence, genital structure, and diagnosis of freemartinism in Hanwoo is needed.

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