

*Original Article*

## The intensity of the magnetic field on different sex of fetus and accuracy of sex detection using gold ring pendulum

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### Abstract

**Objective:** This research aims to measure the intensity of magnetic field of different sex of fetuses and the accuracy of pendulum method for the sex detection of cow fetuses.

**Methods:** Twenty-six Madura cows with gestational age of more than 4 months were used in this research. This research is composed of three steps : 1). Measuring the intensity of the magnetic field on the fetus using an Electromagnetic Field Meter (EMF) type 827 which is affixed to the right side of the abdomen 2). Observe the pattern of the gold ring pendulum used for sex detection of cow fetus 3). Measure the accuracy of the pendulum ring gold method. The data were analyzed using descriptive analysis.

**Results:** The result of this research showed that the intensity of the magnetic field of a male fetus is 0.04  $\mu\text{T}$  for a head, 0.07  $\mu\text{T}$  for back, 0.05  $\mu\text{T}$  for abdomen and 0.03  $\mu\text{T}$  for tail. Magnetic field of a female fetus is 0.03  $\mu\text{T}$  for head, 0.05  $\mu\text{T}$  for back, 0.035  $\mu\text{T}$  for abdomen and 0.01  $\mu\text{T}$  for tail. The gold ring pendulum is a unidirectional pattern for detection male sex showed the accuracy of 91.67% and a rotating pattern for female fetuses showed accuracy of 85.71%. The average accuracy of detection using the gold ring pendulum is 88.46%.

**Conclusions:** The conclusion of this research is male fetuses have a magnetic field higher than male fetus.

**Keywords:** Gold ring; Fetus; Magnetic field; Sex; Pendulum

### INTRODUCTION

The farmer needs to know about the sex of the cow fetus. The sex of the cow fetus will affect the price of the pregnant cow. The price of pregnant cows with a male fetus is higher than the female fetus. The price of the cow determines the investment of the business and continuities of the business [1]. The Indonesian farmer has local wisdom to detect the sex of the fetus using a pendulum gold ring. They used the pendulum gold ring to detect the sex of the fetus which is brought closer to the abdominal part of the pregnant cows.

The pendulum gold ring method showed a unidirectional pattern for the male fetus and a rotating pattern for the female fetus. The different patterns appeared because of the differences in biopotential reactions in the body. Biopotential is the difference in the number of ions in the body that causes different ion densities. This is a factor in the occurrence of differences in particle velocity per unit of time, this causes the emission of waves to also be different [2]. The increasing number of cells in the body will increase the magnetic field [3].

Commonly, male fetuses have a bigger morphometric body compared with female

fetuses [4]. Cells in male fetuses have higher numbers than in females [5]. The different cells number affected by the size of a muscle, a male fetus has a bigger muscle size. This is the reason why the male fetus has a higher intensity of the magnetic field.

Unfortunately, no research discusses the intensity of the magnetic field in the fetus of the different sex. The research about the accuracy of the pendulum gold ring is also not yet done. This research aims to measure the intensity of the magnetic field in male and female fetuses. The accuracy of the pendulum gold ring method for sex differentiation was also measured in this research.

## MATERIAL AND METHODS

### Research unit and tools

Twenty six Madura Cows pregnant with gestational age of 4 to 9 months were used in this research. The research was done on 3 districts in Pamekasan regency. The ultrasonography (USG) for detection of the body position of the fetus, Lutron Electromagnetic Field Meter (EMF) type 827 used to measure magnetic field value on  $\mu\text{T}$  (microTesla) units, gold ring (22 carats of 2 grams) as an object that will resonate with waves, a 20 cm long thread after being tied to a gold ring, the camera as a documentation were used in this research.

### Method

The research was done in three steps, 1). measuring the magnetic field using Lutron Electromagnetic Field Meter (EMF) type 827 affixed to the right abdomen, 2). Sex detection

used the gold ring pendulum to the abdomen, 3). observed the sex of the calf after parturition and confirmed the gold ring pendulum prediction.

### The measure of electromagnetic wave

The ultrasonography (USG) was used to detect the body part to determine the four parts (head, abdominal, back and tail) of the fetus's body. Placed the probe of Lutron EMF affixes on the abdominal with the four parts of the body of the fetus alternately until the magnetic field value appears on the display. Electromagnetic Field Meter is to know the reaction that occurs between the magnetic field and the electric field [6].

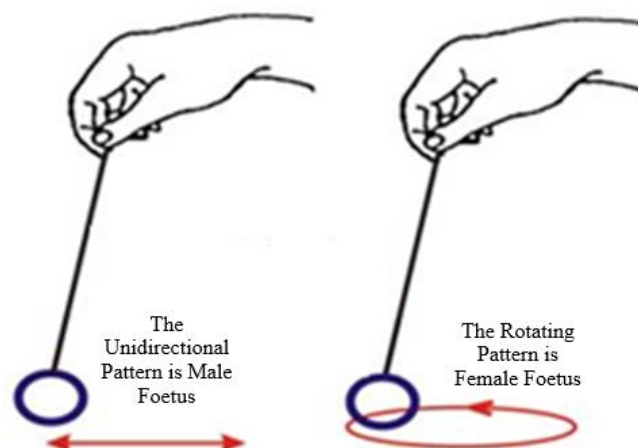
### Sex detection using a gold ring pendulum

Tied gold ring to 20 cm long string as a pendulum. A pendulum is an object tied to a string, the pendulum made of plastic, wood, rings and so on [7]. Put the pendulum near the abdominal of the pregnant cows. Let the pendulum make a pattern. This pattern is an indicator of the sex detection of the fetus. The unidirectional pattern of the pendulum indicates the male sex of the fetus (Figure 1). On the contrary, rotation patterns indicate the female sex of the fetus.

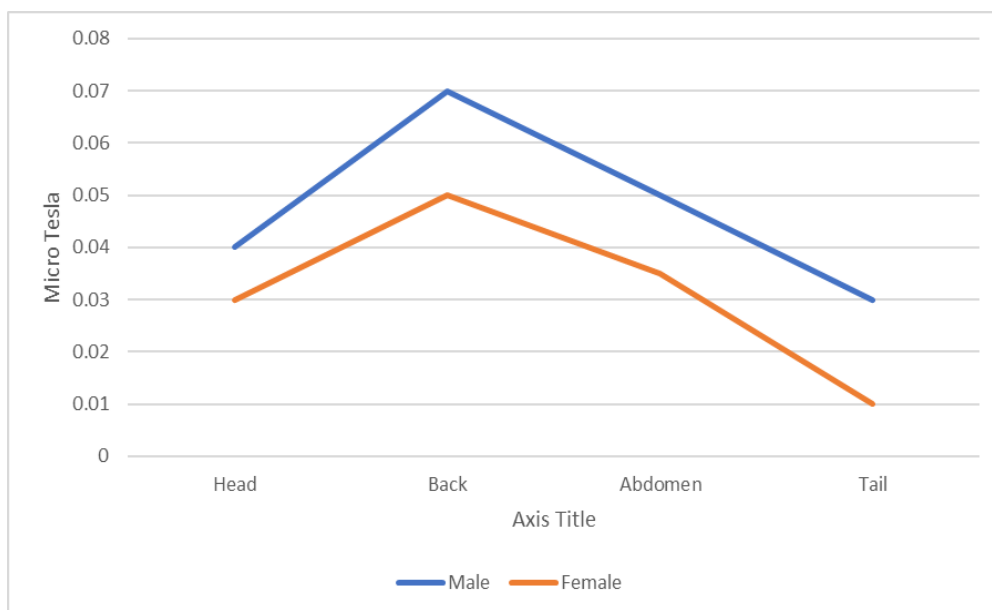
### Counting the accuracy level of pendulum gold ring as sex detection

The accuracy level of pendulum gold ring as sex detection of fetus can be count used the formula below:

$$\text{The Accuracy} = \frac{\text{Pendulum Detection}}{\text{Sex of Calf}} \times 100\%$$



**Figure 1.** The pattern shown by the golden ring pendulum when detecting the sex of the fetus



**Figure 2.** Value of electromagnetic wave level from fetus

**Data analysis**

The intensity of the magnetic field was analyzed using descriptive statistics in the form of average and standard deviation. The accuracy of the pendulum gold ring as sex detection were analyzed using descriptive statistics in the form of percentage.

**RESULTS**

**Value of intensity magnetic field**

Figure 2 showed that the range intensity of the magnetic field on the male fetus was 0.03-0.07  $\mu$ T and the range of the female fetus was 0.01-0.05  $\mu$ T. The intensity of the magnetic field of male fetus was higher than the female on all the body parts of the fetus.

**Accuracy level of pendulum method**

The accuracy level of the gold ring pendulum was fairly high. The accuracy of the gold ring pendulum on male fetuses is 91.67%, otherwise on female fetuses was 85.71%. The average of accuracy was 88.46%. The data of the accuracy gold ring pendulum was shown on Table 1.

**DISCUSSION**

The recent research showed the intensity of the magnetic field of male fetuses was higher than female fetuses. The intensity of the magnetic field or the rate of energy transferred through fast wave propagation is influenced by the radiation power and the surface area/sectional area of the object [8]. The medical world knows that blood vessels are the trajectory of magnetic nanoparticles as a method of treatment [9]. This proves that the basic theory of magnetic field is influenced by the surface area and the number of ions in the body. The higher number of ions in the body will be affected by the increasing intensity of the magnetic fields from the fetus' body. Two-thirds of the elements in living bodies are water (H<sub>2</sub>O) where the element is protium, the isotope most widely accepted by nature [10]. The larger body dimensions are directly proportional to the number of hydrogen ions that have spin and magnetic moments and will produce the highest intensity of the magnetic field. The body morphometric and dimensions of the male fetus are greater than female fetuses and will be affected by the intensity

**Table 1.** The accuracy level test of pendulum of gold ring method

Sex	Pendulum method	Calf	Match	Percentage
Male	12	13	11	91.67%
Female	14	13	12	85.71%
Total	26	26	23	88.46%

of the magnetic field [11]. The intensity of the magnetic field is affected by the different cross-sections of the body. The birth weight of male calves is higher than female calves [12]. The cross-sectional area is directly proportional to the surface area of the emitting object. Based on the body size, the higher intensity of the magnetic fields is dorsal and abdominal of the fetus. The intensity of the magnetic field or the rate of energy transferred through the fast propagation of waves is influenced by the amount of radiation power and the surface area of the object [13].

The pendulum is made of diamagnetic material as a sensitive detector for reading magnetic fields [14]. Diamagnetic materials are materials that do not react with magnets and the direction of the pole is opposite to the magnetic field, the examples are gold, copper and silver [15]. The unidirectional pattern showed the sex of the male fetus and the rotating pattern showed the sex of the female fetus (Figure 1). The different pattern occurs on the pendulum due to the reaction of the magnetic field. The difference in the intensity of the magnetic field is evidenced by several factors such as the value of the force, amplitude, period, frequency and wavelength of the unidirectional pattern which is higher than the rotating one. Patterns that appear both in the same direction and in rotation are a form of reaction between the nuclear poles in the ions which produce a magnetic field around the ions or also known as nuclear magnetic resonance. Then the pattern of the ring motion will show the conditions of the magnetic field and the moment itself.

The concept of a pattern on a pendulum is also proven in a simple study of testing a pendulum on a radio when it turns on and off. When the radio is turned on, the pendulum pattern shows a unidirectional pattern, as if proving that the radio is emitting high enough waves. This is because a radio that is turned on emits radio waves so that there is a reaction to an active magnetic field [16]. Inversely proportional to when the radio is off where the pendulum shows a rotating pattern as if to mean that the waves emitted when the radio is off are quite small. The working system of the radio is to capture magnetic fields and return the signal from the tube by transmitting sound waves into a wireless communication tool [17]. The product of interaction

of magnetic field and an electric field is an electromagnetic wave [18].

Tests are carried out to obtain quality information from the sex detection method. Accuracy tests are carried out to obtain data that can be trusted or close to the truth of the performance of a thing or tool [19]. The accuracy of the gold ring pendulum method is fairly high. The greater the percentage of accuracy in a sample, the smaller the error, so it can be concluded that the higher the percentage of accuracy, the closer to the original state of a sample [20]. Errors that occur due to the death of the fetus so that the estimation of sex using a gold ring pendulum shows the wrong pattern.

## CONCLUSION

The intensity of the magnetic field of male fetuses is higher than female fetuses. Sex detection using a gold ring pendulum shows fairly high accuracy.

## CONFLICT OF INTEREST

The author conveys that no conflict of interest occurred during this research. Both in terms of funding, implementation and so forth.

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