



**Association of Infestation of Gastrointestinal Nematode With Altitudes of Location of Cattle Raising in Two Different Districts in Aceh Province**

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**Abstract**

This study was aimed to measure the prevalence and the association of altitude of location of raising to the risk of infestation of gastrointestinal nematode in cattle. The study was conducted using cross sectional approach. A purposive sampling method was used to select the location of study (subdistricts and villages) in the two Districts. The inclusion criteria for the lowland were the location with altitude <200 m above sea level and the subdistricts (villages) of North Aceh District. The exclusion criteria for lowland was the location >200 m above sea level. Then, the inclusion criteria for the highland were the location with altitude >200 m above sea level and the subdistricts (villages) of Central Aceh District. The exclusion criteria for lowland was the location <200 m above sea level. A random sampling was used for selection of cattle for collecting faecal sample in two locations of study. A total number of 201 cattle, both male and female, were obtained for taking faecal sample from the two Districts. Faecal sample was examined for the existence of eggs of gastrointestinal nematode. The examination was conducted using floating method. Data were analyzed descriptively. The measurement of association of altitude of location of cattle raising and sex of animals to the risk of infestation of gastrointestinal nematode were analyzed using odds ratio (OR) estimation and continued with chi-square test. The results showed a higher prevalence of gastrointestinal nematode infestation in cattle of Lowland location (25%) as compared to Highland (5.8%). As for the altitude, the cattle raising in Lowland were more than 5 times higher risk for infestation of gastrointestinal nematode as compared to Higher land location ( $P < 0.005$ ). The female cattle in Lowland was higher risk (6.18) for infestation than Highland ( $P < 0.01$ ). A similar trend was obtained for male cattle which higher risk in Lowland (4.12) as compared to Highland, but it was not significant ( $P > 0.05$ ). In conclusion, by considering the altitude of location, the cattle raising in Lowland were more than 5 times higher risk for infestation of gastrointestinal nematode as compared to Higher land location. There is a variation of risk between female and male cattle in different altitude.

*Keywords: altitude, climate, gastroniestinal nematode, cattle, Aceh.*

**Background**

Helminthiasis is a disease that mainly occurred in livestock animals and affected the social economic aspects in many countries (Perry *et al.*, 2002), cited by Worku *et al.*, 2017). Subronto (2007) has suggested that the occurrence of this disease cause many negative effects in animal, which are comprised of less body weight increase, low production and population, lack of meat quality, and could transmit the infection to other animals. It is could also resulted in death to the infected animals.

Several factors have been reported as the risk for helminthiasis in livestock animals. Mostly, the livestock raising management is the main factor. In addition,

other factors, such as climate and altitude of location for animal raising are also considered as the risk factor. Rinaldi *et al.*, (2007) has suggested that risk of infestation of helminthiasis, especially gastrointestinal nematode, in cattle and buffalo increased by the condition of climate in raising location. In particular, the occurrence of disease is increased when the animal raising under non-intensive grazing system management.

Furthermore, Hafid (2015) has also suggested that the environment with hot temperature and high humidity are the suitable location for the growth of parasites. In particular, Sanyal (1989) cited by Molla and Bandyopadhyay (2016) has reported that wet and and autum season are a suitable

condition for survival and migration of gastrointestinal nematode. Several factors have been suggested could associated with the increase of infestation and prevalence of gastrointestinal nematode in cattle, they are topography, change of season, temperature, humidity, rate of rain, breed and sex of animals as well as the management system (Tembely *et al.*, 1996); Regassa, *et al.*, 2006; Navarro, *et al.* 2013).

In Indonesia has been reported a variation in the prevalence of gastrointestinal nematode infestation between 10–70% in cattle, buffalo, goat, and sheep (Directorate General of Livestock and Animal Health, 2014). A survey by Yasa (2011) was found prevalence at 52.78% in cattle in Badung District of Bali Province. A lower prevalence of 43% was found in Lamongan District of East Java Province (Khozin, 2013). Then, Zulfikar *et al.* (2012; 2017) was obtained a different prevalence of gastrointestinal nematode infestation in cattle between two different districts in Aceh Province. The prevalence in District of Bener Meriah was lower (22%) than in District Bireuen of Aceh Province (66%). However, in this former study was difficult to measure the association of altitude of location of cattle raising to the risk of infestation of gastrointestinal nematode in cattle, since the two districts location is a neighbourhood to each other. Therefore, to study these association, in the current study was conducted a survey at two different locations that separate in long distance at different altitude in Aceh Province.

## Materials and Methods

### Time and Location of Study

This study was conducted on March to June 2017. The faecal sample were collected from cattle raising in North Aceh District (altitude <200 m above sea level) and Central Aceh District (altitude >200 m above sea level). The location category for altitude <200 m above sea level is Lowlands. Then, location with altitude >200 m above sea level is categorized as Uplands or Highlands (Wikipedia, 2018).

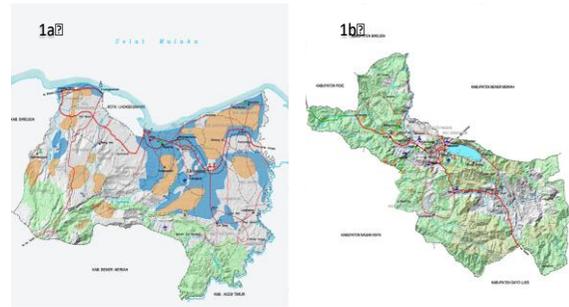


Figure 1. Map of location of study in North Aceh District (1a) and Central Aceh District (1b) of Aceh Province.

### Study Design

The study was conducted using cross sectional approach. A purposive sampling method was used to select the location of study (subdistricts and villages) in the two Districts. The inclusion criteria for the lowland were the location with altitude <200 m above sea level and the subdistricts (villages) of North Aceh District. The exclusion criteria for lowland was the location >200 m above sea level. Then, The inclusion criteria for the highland were the location with altitude >200 m above sea level and the subdistricts (villages) of Central Aceh District. The exclusion criteria for lowland was the location <200 m above sea level.

A random sampling was used for selection of cattle for collecting faecal sample in two locations of study. A total number of 201 cattle, both male and female, were obtained for taking faecal sample from the two Districts.

### Examination of Faecal Sample

For each faecal sample obtained from this study was examined for the existence of eggs of gastrointestinal nematode. The examination was conducted using floating method.

### Data Analysis

Data were analyzed descriptively. The analysis was conducted to estimate prevalence of gastrointestinal nematode infestation in cattle in each district in this study. The measurement of association of altitude of location of cattle raising and sexes of animals to the risk of infestation of gastrointestinal nematode were analyzed

using odds ratio (OR) estimation and continued with chi-square test.

### Results and Discussion

This study, as far as we know, was the first investigation for comparing the different of prevalence and measurement of association of altitude of location of cattle raising and sex of animals to the risk of infestation of gastrointestinal nematode in Aceh Province. The survey was conducted in purposively selected three sub-districts in the District of North Aceh and three sub-districts in the District of Central Aceh that fulfilled the inclusion criterion. A total of 132 faecal samples were obtained from cattle in the District of North Aceh, which comprised of 75 female and 57 male cattle. Then, in the District of Central Aceh were obtained 69 cattle faecal sample, which comprised of 75 female and 57 male cattle (Table 1).

Based on the data in Table 1, it was found a higher prevalence of gastrointestinal

nematode infestation in cattle of Lowland location (25%) as compared to Highland (5.8%). In Lowland, most of the proportion of the cases were found in female cattle (27%) as compared to male cattle (23%). On the other hand, in Highland location was found the proportion of positive cases of gastrointestinal nematode infestation almost similar between female (5.6%) and male cattle (6.7%).

The results of measurement of association are showed in Table 2. As for the altitude, the cattle raising in Lowland were more than 5 times higher risk for infestation of gastrointestinal nematode in cattle as compared to Higher land location ( $P < 0.005$ ). The female cattle in Lowland was higher risk (6.18) for infestation than Highland ( $P < 0.01$ ). A similar trend was obtained for male cattle which higher risk in Lowland (4.12) as compared to Highland, but it was not significant ( $P > 0.05$ ).

Table 1. The results of faecal examination for gastrointestinal nematode infestation in cattle in Highland and Lowland locations in Aceh Province.

Location (District)	Altitude Category	Total Sample	Female cattle		Male Cattle		Prevalence (%)
			(+)	(-)	(+)	(-)	
North Aceh	Lowland	132	20	55	33	44	25 (95% CI: 18.39 – 33.02)
Central Aceh	Highland	69	3	51	1	14	5.8 (95% CI: 2.29 – 13.98)

(+) = positive results of faecal examination for eggs of gastrointestinal nematode

(-) = negative results of faecal examination for eggs of gastrointestinal nematode

CI = confidence interval.

Table 2. The measurement of association of altitude of location of cattle raising and sex to the risk of infestation of gastrointestinal nematode in cattle in highland and lowland locations in Aceh Province.

Measurement of Association	OR	P-value
Lowland vs Highland	5.42 (95% CI: 1.83 – 16.01)	0.0009
Risk in female cattle: Lowland vs Highland	6.18 (95% CI: 1.73 – 22.05)	0.002
Risk in Male cattle: Lowland vs Highland	4.12 (95% CI: 0.5 – 34.5)	0.2

OR = odds ratio

CI = confidence interval.

There are variation results of studies on comparing prevalence of gastro intestinal nematode in female and male cattle. Abdulkadir et al (2017) found a prevalence of 47.5% in female bovine, which was higher than in male bovine (35.3%). A similar result had been documented in a study by Shimelies et al. (2011). In contrast, the results of survey by Gauly et al. (2006) and Raza et al. (2007) showed a higher prevalence in male animals. On the other hand, our study showed the prevalence was slightly higher in female cattle in Lowland location, but slightly higher in male in Highland location. However, the possible explanation for the differences between females and males in susceptibility to parasite infection are probably caused by a difference in behavior morphology or physiological status of sex. It is possible that the different hormonal status of sexes may affect the immunological responses due to estrogen stimulatory immunological responses that stimulatory androgen and suppresses the immune response. In addition male animals are known to have high natural tendencies of acquiring diseases generally because they tend to move in search of mates for courtship and breeding purposes as well as mostly exposed to graze than female (Mukhtar et al., 2015; Temesgen et al., 2017).

Study on comparison of prevalence of gastrointestinal nematode infestation in cattle raised at different altitude is very limited, if any. A study in sheep and goat by Koinari et al. (2014) was found not significant different of prevalence of gastrointestinal nematode infestation in Lowland and Highland. On the other hand, a study conducted by Abdulkadir et al (2017) showed that the prevalence of gastrointestinal nematode in cattle was higher in Lowland (47%) than in Highland (33%). The results in our study are in agreement with Abdulkadir et al (2017). Possibly, this condition is caused by different climatic or environmental factors that may affect the existence of gastrointestinal nematode in Lowland and Highland area of cattle raising (Mideksa et al., 2016).

Based on the results those were described above we concluded that by considering the altitude of location, the cattle raising in Lowland were more than 5 times higher risk for infestation of gastrointestinal nematode as compared to Higher land location. There is a variation of risk between female and male cattle in different altitude.

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