Drinking and feeding behavior of Ongole Crossbred Heifer with water-free access at MergoAndhini Makmur Farmer Group, Yogyakarta, Indonesia

Endang Baliarti1, Andriyani Astuti, Arsy Wiandita, Astrid Listia Astrini
1 Faculty of Animal Science, Universitas Gadjah Mada, Yogyakarta, Indonesia.

E-mail: bali_arti@ugm.ac.id

Abstract. This study was aimed to determine the effect of the water-free access on drinking and feeding behavior of Ongole Crossbreed (OC) heifer in the Mergo Andhini Makmur farmer group in Bolu Village, Yogyakarta, Indonesia. Ten OC heifers with an average body weight of 280 kg divided into two treatment groups. The first treatment (P0) gave water according to the farmer used to give (control group), while the second group (P1) with water-free access. The feed given was forage and concentrate. Feeding and drinking behavior which were feeding duration, frequency of eating, drinking, urination, and defecation during 7 consecutive days were collected then analyzed by One Way ANOVA to see if there were differences between two group of water accessed. The results showed that the frequency of drinking of free access water group was higher (P<0.05) compared to the control group (5.9 ± 2.6 vs 1.00 ± 0.00 times/day), while duration and frequency of eating, frequency of urination, defecation and amount of defecation and urination were not significantly different (P>0.05). The results of this study concluded that Ongole Crossbred heifer needs water-free access than those restricted ones for better performances.

1. Introduction
The government launched a program to conserve and increase the population of Ongole Crossbred (OC) cattle through the establishment of a Village Breeding Center (VBC). One of the farmer group chosen as VBC on D.I. Yogyakarta was the Mergo Andhini Makmur (MAM). However, calf harvest rates and cows’ performance in MAM are still low. Bad performance of the cows could be caused by lack of water intake. Lack of water intake is one of the causes of decreased reproductive efficiency because it is always followed by reproductive disorders in cows and bulls.

Water was an important nutrient and is involved in every metabolism of body functions [1]. Alamer [2] states that the provision of water is important in the needs of water in the body and the restricted water can be a factor that affects the physiology and productivity of livestock. The source of water for ruminant animals can be fulfilled by drinking water consumed, water contained in feed and metabolic water. Many farmers do not pay attention to the provision of water to their livestock. Some farmers assume that the need for water has been fulfilled by the water in the forage feed.

Behavior is any animal activity that occurs as a result of certain stimulants that can originate from outside or from inside the animal's own body as a reaction to its environment. Examples of environmental influences that can affect behavior are water restrictions [3]. The direct effect of water restrictions is a reduction in food consumption and thus also a reduction in growth and food efficiency [4]. Restrictions on the provision of water can cause a reduction in feed [5]. Several previous studies...
have shown a decrease in feed consumption due to restrictions on drinking water in cattle [6, 7]. Adequacy of water intake will affect the consumption of animal behavior. Knowledge related to proper management of water supply to livestock will help smallholder farmers to improve the performance of their livestock so this research needs to be done.

2. Materials and Methods

2.1. Materials
This research used 1.5-2 years old 10 Ongole Crossbreed heifer that raised by Mergo Andhini Makmur Farmer Group. The body weight of cattle that had been used in this research was around 280 kg.

2.2. Methods
Ten OC heifers with an average body weight of 280 kg was divided into two treatment groups. The first treatment (P0) gave water according to the farmer used to give (control group), while the second group (P1) with water-free access. The feed given was forage and concentrate. Feeding and drinking behavior which were feeding duration, frequency of eating, drinking, urination, and defecation during 7 consecutive days were collected then analyzed by One Way ANOVA to see if there were differences between two group of water accessed.

3. Results and Discussion
The result show there were significant differences in water consumption, water consumption based on metabolic body weight, DM consumption, and OM consumption (Table 1). The difference in water consumption that is significantly different indicates the amount of drinking water supply at the small farmer still does not meet water needs. The amount of drinking water consumption in ad libitum and restricted treatment is still low when compared with previous research by [8] which states that the average cow consumes water as much as 29.98 L ± 8.56 L/head/d. If adjusted for metabolic weight, cows consume as much as 0.38 L ± 0.11 L/kg MBW. The average consumption of DM is 9.73 kg ± 2.01 kg/d or 0.13 kg of feed/kg of Consumption of DM based on metabolic body weight. The higher water consumption increases the consumption of DM and OM consumption. This is in accordance with the research of [8] which states that the consumption of water is correlated positively to feed consumption.

Table 1. Water, Dry Matter, and Organic Matter of Heifer

| Parameter                        | Treatment        |       |       |
|----------------------------------|------------------|-------|-------|
|                                  | Ad libitum       | Restricted |
| Water intake (Liter/head/day)    | 9.88±4.86a       | 2.66±2.26b |
| Metabolic water intake (Liter/kg BW0.75) | 0.144±0.016a   | 0.038±0.037b |
| DM intake (g/head/day)           | 5665.17±1470.21a | 4878.82±1351.05b |
| DM/BW intake (g/kg BW0.75)       | 82.45±12.21      | 75.93±9.21 |
| OM intake (g/head/day)           | 4551.23±1201.76a | 3838.25±1091.03b |
| OM/BW intake (g/kg BW0.75)       | 66.05±9.67       | 59.66±8.39 |

a,b = Different superscripts on the same line showed significant differences (P <0.05)

3.1. Behavior
Observation of behavior in cows by water ad libitum and restricted shows differences in behavior in drinking frequency. The difference in frequency of drinking is because there are differences in the time of watering. The first treatment is by providing water ad libitum or available continuously and the second treatment with restricted treatment is given only once per day. These results are in accordance with [9] which states that when given an opportunity, cows tend to consume food and drink alternately. Therefore, the drinking frequency will be more when drinking water is available on ad libitum.
These results accordance from the previous study [10] which states that the frequency of drinking OC cows that are not estrus with ad libitum can reach 4 times / day. Collier [11] stated that the factors that influence the amount of water intake are feed intake, physiological conditions, breed and environmental conditions.

**Table 2. Drinking and Feeding Behavior of Ongole Crossbred Heifer with Water-Free Access**

| Parameter                        | Treatment          | Restriction       |
|----------------------------------|--------------------|-------------------|
|                                  | Ad libitum         |                   |
| Eating frequency (times/day)     | 8.40±2.64          | 9.00±3.21         |
| Longtime eating (hour/day)       | 5.67±1.69          | 5.66±1.74         |
| Drinking frequency (times/day)   | 5.9±2.6a           | 1.00±0.00b        |
| Defecation frequency (times/day) | 9.35±3.00          | 9.25±2.40         |
| Urination frequency (times/day)  | 6.75±2.67          | 6.0±2.63          |

a,b = Different superscripts on the same line showed significant differences (P <0.05)

4. Conclusion

The results of the study concluded that heifers with ad libitum drinking water for 7 days could increase feed consumption, drinking water and drinking frequency, but did not significantly influence animal behavior (feeding time, feeding frequency, urination frequency, defecation frequency, and amount of urination).

Acknowledgments

Thanks to the farmer group “Mergo Andhini Makmur” who have allowed for the research location

References

[1] Kumar D, K DeA K Singh, Kumar K, Sahoo A and Naqvi SMK 2016 *J. Veterinary Behavior* 12 pp 54-59
[2] Alamer M. 2010 *J. Basic App. Sci. Res.* 11: pp 189-205
[3] Little W and Shaw SR 1978 *Anim. Prod.* 26: pp 225–237
[4] Anggorodi R 1979 *Ilmu Makanan Ternak Umum (General Livestock Feed Science)* PT.Gramedia Jakarta.
[5] Gunawan 2014 *Teknologi Pakan Mendukung Pengembangan Sapi Potong di Indonesia* (Feed Technology Support Beef Cattle Development in Indonesia) Gadjah Mada University Press. Yogyakarta pp 67-68
[6] Ali A, Mustafa MI, Bilal MQ, Muhammad G, Latief M and Ullah S 2015 *J. Anim. Plant Sci.* 25(1): pp 19-22
[7] Burgos MS, Senn M, Sutter F, Kreuzer K, and Langhans W 2001. *J Physiol Regulatory Integrative Comp Physiol* 280: pp 418-427
[8] Brew MN, Myer RO, Hersom MJ, Carter JN, Elzo MA, Hansen GR and Braund DG *Livestock Science* 140: pp 297–300
[9] Nocek JE and Braund DG 1985 *J. Dairy Sci.* 68: pp 2238-2247
[10] Priambodo P 2018 Undergraduate thesis in Gadjah Mada University, Yogyakarta, Indonesia
[11] Collier RJ and JL Collier 2012 *Environmental Physiology of Livestock* (Singapore: Wiley-Blackwell)