

The study of health of large animals in the activities using animals

Summary of Doctoral Thesis

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In recent years, various types of activities involving animals have attracted attention in the areas of therapy, education, and recreation for humans. The common purpose of these activities is a beneficial change in mental, physical, and social health induced by them in humans. Primarily, dogs and horses have been used for such activities; however, there are reports involving farm animals such as cattle and sheep in such activities. Such activities improve human contact with animals and additionally improve hypertension, relieve loneliness in the elderly and dysphoria in the disabled, improve self-esteem in emotionally disturbed children, increase the feeling of responsibility, and induce social behavior and personality development. Despite such great benefits of these activities in humans, there are only few studies evaluating the stress on and welfare of animals, especially large animals involved in these activities. Additionally, farm animals such as cattle play a role in food production. Thus, it is assumed that such animals should be subjected to activities with less stress to enhance their relationship with humans.

Small-sized horses, such as ponies, are often involved in activities with children due to their manageable size and their gentle temperament. However, a study reported that ponies are more likely to be affected by hyperlipidemia than full-sized horses. Thus, special attention needs to be paid to feeding management depending on the animal breed involved in activities with humans.

The present study aimed to improve the welfare of animals such as cattle and horses that are involved in various activities with human.

In chapter 1, the stress experienced by dairy cattle was investigated during the first year of student practice training, which was a part of animal-assisted education. Assessments performed included monitoring changes in blood biochemical parameters such as the cortisol (COR) level and the milking amount and speed.

In chapter 2, the difference between different horse breeds such as thoroughbreds,

ponies, and miniature horses was clarified by assessing biochemical markers. In addition, a survey research was conducted among the members of an equestrian club regarding feeding treats to horses.

Chapter 1. Stress level in dairy cattle during student practice training

The stress level in dairy cattle was investigated during the first year of student practice training, which was a part of animal-assisted education. In this chapter, the stress level in dairy cattle was assessed before and after student practice training. For this, serum biochemical markers such as COR, blood glucose (GLU), and total protein (TP) levels were evaluated. In addition, oxidative stress and antioxidative potency of the cattle were assessed along with the milking amount and time. These evaluations were performed 5 days before and 5 days after the training.

In dairy cattle ($n = 29$), the mean COR level significantly increased to 10.57 ng/ml after the training from 6.95 ng/ml before the training. Thus, the student practice training, which implies that many unfamiliar people come in contact with the dairy cattle, induces high stress levels in these animals. This was deduced from an approximately 1.5-fold increase in the mean serum COR level after the training compared with that before the training. In other studies, investigating stress in dairy cattle, the plasma COR level after long-distance transport was five times higher than that before the transport. Similarly, the serum COR level was 6.6 times higher after hoof shaving than that before hoof shaving. Thus, compared with these findings, the stress level increase in the dairy cattle observed in this study was deemed not substantial. Furthermore, because there was little change in the milking amount and time before and after the student practice training, practice training was assumed to not represent a significant stress factor that influences productivity in dairy cattle. Thoroughly ensuring punctual feeding and subsequent milking in daily

cattle, after gaining relevant knowledge regarding activities influencing these parameters, was assumed to induce less stress in these animals during the student practice training.

Based on the rate of increase in the COR level, the dairy cattle were divided into two groups according to the percentage of rise [$100 \times (\text{COR concentration in serum after training} / \text{COR concentration in before training})$]: high increase group (324.24 %, n = 11) and low increase group (107.07 %, n = 18). A significant negative correlation was noted only between the serum COR level and age in the high increase group. It was thought that the cattle of high-rise-rate group relief to decrease stress with experience. A markedly high serum COR level was observed before the training in several cattle animals in the low increase group. Blood sampling may have been perceived as a novel stimulus, which may have contributed to stress recorded in this group.

Regarding the other biochemical markers that were investigated, a significant difference before and after the training was observed only for blood urea nitrogen (BUN) level. BUN, the end metabolite of proteins and a marker of ingested proteins, may be a possible marker of stress in cattle.

Chapter 2. Heath study in horses

Section 1. Differences in blood biochemical parameters among horse breeds

The following studies were performed in horses that are often used in activities involving humans. In section 1, serum biochemical markers were assessed in a total of 113 healthy horses comprising thoroughbreds (n = 50), ponies (n = 49), and miniature horses (n = 14) housed in multiple equestrian clubs. The difference in these breeds based on the biochemical parameters was assessed using multiple

classification analysis. A significant difference was noted among the three breeds with regard to 12 serum biochemical parameter levels, except for six parameters including alkaline phosphatase and lipase levels. The findings from principal component analysis (PCA) were classified into three categories as thoroughbreds, ponies, and miniature horses. The factors contributing to the classification of horse breeds were assessed using a loading plot. Seven items including total bile acid, amylase, and TP levels may contribute to the classification of thoroughbreds; five items including lactate dehydrogenase and triglyceride (TG) levels may contribute to the classification of ponies; and only GLU level may contribute to the classification of miniature horses. Five items including total cholesterol (T-CHO), thyroxine, and COR levels were associated with both ponies and miniature horses. Especially, as TG and T-CHO levels were related to small-sized horses including ponies and miniature horses but not thoroughbreds hyperlipidemia seems more likely to occur in small-sized horses than in thoroughbreds. PCA also identified differing TG kinetics between thoroughbreds and small-sized horses. The rate of discrimination by discriminant analysis was 96.0% for thoroughbreds, 79.59% for ponies, and 92.86% for miniature horses. Since ponies in the present study included crossbreeds, the rate of discrimination for ponies was lower than that for either of the two other groups.

Section 2. Equestrian club members' survey regarding treats

In this section, using a questionnaire survey, the consciousness regarding feeding treats to horses was investigated. The survey was conducted among members (n = 43) of an equestrian club located in Shizuoka Prefecture. The survey comprised two questions: "What do you think about feeding treats to horses?" and "Do you give people words of warning about feeding treats to horses?" After informing the

members about the TG levels in horses, the number of treats offered to horses significantly decreased and the number of warnings to people who fed treats to horses significantly increased. The answers related to the health of horses as assessed using a free description included the following: “treats within reasonable bounds are not a problem” and “the suitability of feeding may not be a problem.” Since members revised their judgment about feeding treats after clarifying TG levels in horses, correct knowledge may reduce the excessive feeding of treats and may help reconsider health associated with feeding management in horses. The analysis was also performed based on the gender of members, the presence or absence of horseback riding experience before joining the club, and the presence or absence of companion. In conclusion, a significant difference was noted only regarding the presence or absence of horseback riding experience. The knowledge regarding horses was higher in members having prior horseback riding experience than in those having no prior experience. Finally, a comparison between members owing a horse (owners) and those not owing a horse (non-owners) was performed. Owners had a significantly lower favorable opinion regarding feeding treats than non-owners with or without clarification. Moreover, with or without clarification about TG levels, more owners addressed warnings and exercised caution relative to treats. In the free description, the following opposite views were stated: “I want to prohibit treats,” “the amount of intake is uncertain with treats,” and “I want you to stop feeding treats according to the notice prohibiting feeding treats.” Horse owners may have higher apprehension regarding treats, because treats are associated with an uncertain amount of intake owing to an uncertain composition. Although the members gave horses a carrot or an apple as an expression of affection, feeding treats is perceived as potentially harmful for the health of horses. The knowledge regarding horses, including their nutritional status, is important for maintain their

health. Thus, the present study clarified the necessity of support from owners and the general population. Veterinary nurses and veterinarians contribute in increasing the knowledge regarding animal in the general population.