

# Secondary nutritional hyperparathyroidism in ponies in Northern Thailand

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## Introduction

Many countries in SE Asia have a long standing tradition of using ponies to work in the fields and for transportation. Lam-pang town in Northern Thailand has a population of 350 ponies that today are used to transport tourists in carriages. These ponies are owned by local farmers with very low income. Their knowledge of equine nutrition is limited and they feed their horses with waste products like rice bran and locally grown grasses (*Setaria* spp.). Previously, many suffered from malnutrition and especially secondary nutritional hyperparathyroidism (HPT) due to unbalanced levels of calcium and phosphorus in their diet. Rice bran has high levels of phosphorus and low levels of calcium. *Setaria* spp. contains high amounts of oxalate (Lewis 1996) and oxalate binds calcium and makes it unabsorbable from the GI tract. The main symptoms of HPT or "big head" are increased size of the nose and lower jaw, due to demineralization of the bones, where minerals are replaced by fibrous tissue (figure 1). Additional symptoms are respiratory noise, lameness, bone and joint tenderness, loose teeth and emaciation (Lewis 1996, Freestone and Seahorn 1993). The objectives of the project were to improve the clinical situation through inexpensive effort and increase the understanding of nutrition and health care among the horse owners. We expected daily supplement of cheap limestone to be sufficient to prevent HPT and in some cases reduce the severity of the symptoms. By teaching and influencing the owners to increase the wellbeing of the animals we expected to raise their level of income and in this way encourage them to continue to this project.

## Material and methods

Approximately 250 ponies participated in the general health care program. 149 ponies were included in the current survey and monitored (61 mares, 11 geldings and 77 stallions). These ponies were checked for clinical signs of HPT such as increased size of head, chewing difficulties, muscle soreness, lameness and respiratory problems. Additionally, they were assessed for their age, size, weight and body condition. We collected information on their feeding, type of food, forage and supplements, as well as access to pasture (hours), hours of work, and hours they spent in the stable/shed. Feed samples were analyzed for energy, protein and mineral content.

Based on this, we started a nutritional and health program. We organized several workshops where the importance of calcium and consequences of malnutrition was pointed out. The horse owners were offered limestone at a reduced price but the decision to use calcium rested upon the owner. Subsequently, all ponies and their owners were checked every three months and their use of calcium and clinical signs of HPT were registered. Serum samples were taken to measure Parathyroid Hormone (PTH), serum calcium, phosphorus and creatinine following the protocol of Estepa et al. (2003). The first samples were from August 2003 and the second from February 2004.

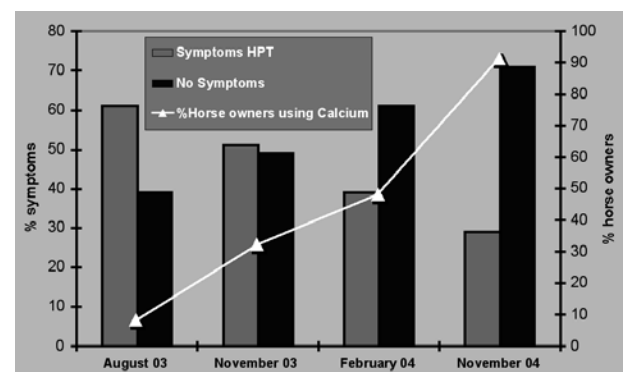
## Results

In August 2003, more than 60% of the ponies had clinical signs of HPT and less than 10% of the horse owners used cal-



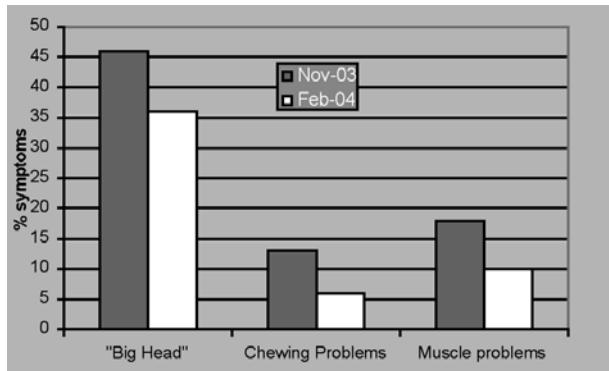
**Fig 1** showing 2 ponies with symptoms of HPT or "big-head" with demineralization of the facial bones.

cium as feed supplement (Figure 1). The feed analysis showed that Ca:P in the diet before supplementation on average was 0.15-0.30. Each horse owner got individual instructions and depending on daily intake of calcium, phosphorus and oxalate, calcium supplementation was decided to be 40-120 g limestone/pony/day, increasing Ca:P in the diet to between 1.0 and 1.5. In November 2003, 32% of the horse owners used calcium supplements, and 51% of the ponies showed clinical signs of HPT. In February 2004, 48% of the horse owners used calcium and 39% of the ponies had symptoms. Towards the end of 2004, more than 90% of the horse owners used calcium supplements, less than 30% of the ponies had signs of HPT and the severity of the symptoms was



**Fig 2** showing the reduction of horses with clinical signs of HPT together with increased use of Calcium supplementation.

reduced (Figure 2 and 3). The amount of calcium used in Lampang town increased in the same period from less than 10 kg/month to more than 300 kg/month. In August 2003,



**Fig 3** showing the reduction of the different clinical signs of HPT from November 2003 to February 2004.

serum samples ( $n=15$ ) showed increased PTH levels (mean  $\pm$  SE =  $230 \pm 81.5$  pg/ml). In February 2004, the concentration was lower ( $173 \pm 51.3$  pg/ml), while serum concentration of Ca, P and Creatinine showed no difference from the first to the second sampling.

## Discussion

Secondary nutritional hyperparathyroidism (HPT) is not an important disease among horses in the temperate climate and in countries with high income and general understanding of animal welfare. There is limited focus on treatment or prevention of HPT in the veterinary education, even in countries where the disease is a common problem. Unfortunately, numerous horses and ponies in SE Asia suffer from malnutrition and lack of health care. In our project the ponies in Lampang got calcium supplementation (limestone) to balance the Ca:P uptake, prevent HPT and reduce the symptoms of this disease. The recommended amount of limestone depended on the daily intake of rice bran, and horse owners using large amounts of rice bran were recommended to use higher amounts of calcium. In the period from August 2003 until November 2004, the symptoms of HPT decreased from over 60% to less than 30% among the ponies in Lampang (Figure 2). Serum analyses before treatment showed very high levels of PTH (230 pg/ml) compared to normal horses (20-50 pg/ml, Estapa et al. 2003) and there was a clear tendency to reduced levels a few months after treatment started (173 pg/ml). This reduction is not statistically significant, however, and may be due to the low number of samples ( $n=15$ ). Serum concentration of Ca, P and creatinine remained the same before and after treatment, which correlates well with other studies (de Behr et al. 2003). The severities of the symptoms were reduced as well in this period (Figure 3). Symptoms caused by pain and inflammation (chewing problems and

muscle problems) were reduced faster compared to symptoms resulting from bone remodeling ("big head"). The reduction in frequency of HPT was higher than expected. We were able to reduce the severity of the symptoms in quite a short time and in several cases the symptoms of "big head" disappeared in 6 months. The use of calcium depended on the owners' cooperation. In the period from August 2003 until November 2004, the owners recognized improved health status and better performance among their ponies. Better performance results in higher earnings, which encouraged more and more owners to use calcium. Owners participating in our workshops were the first ones to use calcium. Cooperation requires information and understanding but it turns into a self-accelerating process when the results become obvious.

## Conclusion

Our work has shown that it is possible to increase animal welfare and improve the health among ponies in SE Asia even with very limited funding. Cheap limestone can balance traditional feeding with rice bran and cut grass and prevent as well as cure symptoms of secondary nutritional hyperparathyroidism. Education can encourage horse owners to change their old habits and positive results turn the project into a self-accelerating process. We believe our project may serve as a role model for others who wish to prevent malnutrition and work with horse welfare in SE Asia and other regions with tropical climate.

## References

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