

# Epidemiological Characteristics of Horses with PPID at Initial Diagnosis<sup>1</sup>

Grubbs S.T.,<sup>A</sup> Neal D.L.,<sup>A</sup> Keefe T.J.<sup>B</sup>

<sup>A</sup> Boehringer Ingelheim Vetmedica, Inc, St. Joseph, MO, USA <sup>B</sup> Colorado State University, Fort Collins, CO, USA

## Introduction

Pituitary pars intermedia dysfunction (PPID) has been described as the most common endocrinologic disorder of aged horses. Few studies exist that describe the epidemiological characteristics of horses with PPID. Additional epidemiologic studies are needed to determine the prevalence of PPID in a larger population, not just aged horses.

## Study Purpose

The purpose of this study was to obtain epidemiological information that included age, breed, sex, clinical signs and insulin/glucose status at initial PPID diagnosis (new cases) from a large population of horses.

## Materials and Methods

Horses of any age, breed and sex from the continental US were eligible for study enrollment as long as they were documented to be exhibiting one or more of the following clinical signs: generalized or regional hypertrichosis, muscle wasting, abnormal fat distribution, lethargy, laminitis (unknown etiology), polyuria, polydipsia, susceptibility to infections, abnormal sweating, and/or inappropriate lactation. Normal horses were excluded from the study. At initial visit, demographic data, signalment and a physical examination was conducted. Clinical signs were documented and blood was drawn for basal ACTH, fasting insulin, and glucose. Blood samples were processed and shipped overnight to the Animal Health Diagnostic Center, Cornell University, Ithaca, NY for analysis.

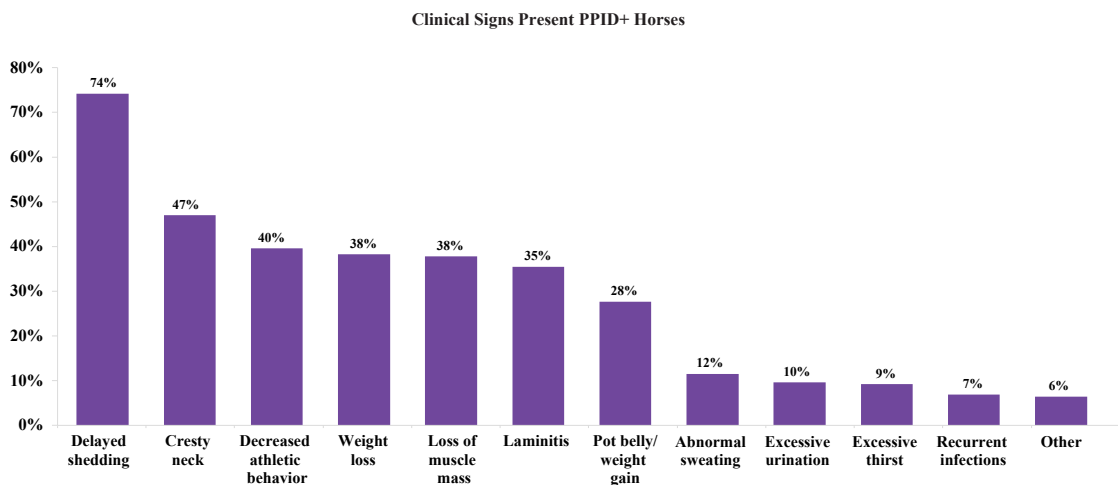
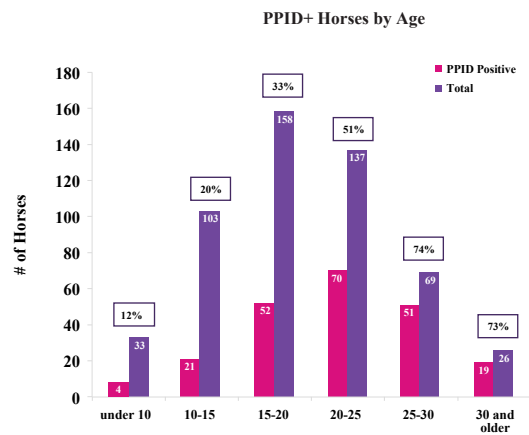
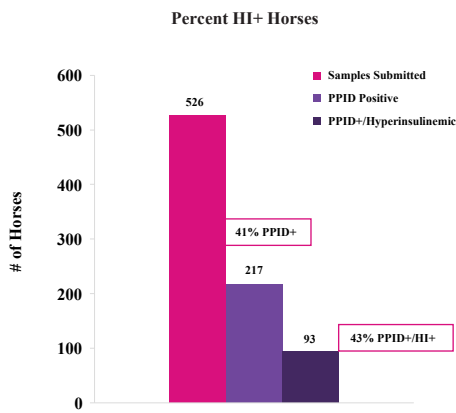
## Statistical Analysis

The association between PPID status, based on ACTH and insulin results, and each of the demographic variables (age, sex, breed and geographic region), the two test result variables insulin and glucose were statistically evaluated individually using the Pearson chi-square test. Odds ratios for significant predictors of PPID status were computed using corresponding 95% confidence intervals when applying multiple logistic regression analysis.

## Results

Five hundred fifteen of nine hundred eighty-two horses with complete epidemiological information were included in the final data analysis. Of the 515 horses, 222 (43%) were PPID<sup>+</sup>, 203 (39.4%) were IR<sup>+</sup>. Further, horses were stratified into 1 of 4 groups based on ACTH and insulin laboratory results: (PPID<sup>+</sup>/IR<sup>-</sup>), (PPID<sup>+</sup>/IR<sup>+</sup>), (PPID<sup>-</sup>/IR<sup>+</sup>), and (PPID<sup>-</sup>/IR<sup>-</sup>).

Of the 515 horses, 115 (22.3%) were PPID<sup>+</sup>/IR<sup>-</sup>, 97 (18.8%) were PPID<sup>+</sup>/IR<sup>+</sup>, 106 (20.6%) were PPID<sup>-</sup>/IR<sup>+</sup>, and 197 (38.3%) were (PPID<sup>-</sup>/IR<sup>-</sup>). Of the 515 horses evaluated, 18.5% of horses <15 years of age were PPID<sup>+</sup>, 33% of horses 15 to 19.9 years of age were PPID<sup>+</sup>, 56.3% of horses 20 to 24.9 years of age were PPID<sup>+</sup>, and 74% of horses >25 years of age were PPID<sup>+</sup>. In particular, the odds of PPID for horses between 15 and 19.9 years of age was approximately twice (2.2) that for horses <15 years old. Compared to horses in the youngest age group, the odds ratio (OR) for PPID increased to 4.6X for horses between 20 and 24.9 years of age and to 14X for horses ≥25 years of age. Even after adjusting for the age of the horses, insulin-resistant horses were seen to have approximately twice the odds (1.9) of PPID, compared to horses with normal insulin levels.



## Discussion

Of the 515 enrolled horses, 61.7% were diagnosed with an endocrine disorder (PPID and/or hyperinsulinemia). As expected, PPID prevalence increased significantly ( $P < 0.001$ ) by age and was significantly higher in horses with above-normal levels of both insulin and glucose ( $P = 0.014$  and  $P = 0.016$ , respectively). Further, 43 percent of PPID horses were also hyperinsulinemic. Long-term studies need to be conducted in large populations of horses to further evaluate endocrinopathies in horses.

## Take Home Message

When evaluating horses with suspected endocrine disease; at a minimum, ACTH, insulin and glucose should be evaluated.

## References

1. Grubbs S, Neal D, Keefe T. Epidemiological characteristics of horses with PPID at initial diagnosis. *J Vet Intern Med* 2015; 29: 1231.