Effects of Astaxanthin and L-Carnitine Supplement on Muscle Damage and Incidence of Equine Tying-Up Syndrome

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Continuous administration of astaxanthin and L-carnitine supplement has preventive effects on the onset of tying-up syndrome and thus may contribute to maintaining performance in Thoroughbred horses. Authors’ addresses: Hidaka Training and Research Center, Japan Racing Association, 535–1 Nahicha, Urakawa, Hokkaido 057–0171, Japan (Sato, Omura, Ishimaru, Korosue, Endo, Murase and Nambo); Life Science Division, Fuji Chemical Industry Co, Ltd, 55 Yokohoonji, Kamiichi, Nakaniikawa, Toyama 930–0397, Japan (Yamashita); e-mail: Fumio_Sato@jra.go.jp. *Corresponding and presenting author. © 2013 AAEP.

1. Introduction
Tying-up syndrome is the most common muscle disorder in training horses. We focused on both the strong antioxidant effect of astaxanthin and the enhancement of muscle fatty-acid oxidation of L-carnitine. The effects of dietary administration of astaxanthin and L-carnitine supplement on serum markers of exercise-induced muscle damage and the onset of tying-up syndrome in training horses were investigated.

2. Materials and Methods
A supplement group (n = 31) received daily supplementation with astaxanthin (75 mg) and L-carnitine (3000 mg) for 8 weeks; a control group (n = 32) received no supplementation. Blood samples were collected after exercise training before supplementation and 3 days and 8 weeks after starting supplementation. The symptoms of tying-up syndrome in both groups were retrospectively evaluated.

3. Results
Within the control group, creatine kinase activity at 8 weeks was significantly increased compared with 3 days; no significant change was observed in the supplement group. After 8 weeks, creatine kinase activity in the supplement group was significantly lower than that in the control group; lactate dehydrogenase-5 also tended to be lower in the supplement group. The incidence of tying-up syndrome in the supplement group was significantly lower than that in the control group.

4. Discussion
Continuous dietary administration of astaxanthin and L-carnitine attenuates exercise-induced muscle damage and prevents the onset of tying-up syndrome in Thoroughbred horses.