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### Feeding and Veterinary Management OF THE SPORT HORSE



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## **Equine Nutrition—A European Perspective**

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### INTRODUCTION

Of the approximately 58.4 million horses worldwide, about 44% are located in North and South America, and 10% in Europe (FAO, 2008). Exact information about the use of horses in the different areas is lacking. There still may be many horses used in agricultural or forestry businesses and as transportation, but most are associated with breeding and sport. Warmblood horse breeding in Europe is mostly embedded in agricultural production (e.g., raising stallions on common farms), while breeding trotters and Thoroughbreds is accomplished on specialized stud farms. The governments of several European countries like France, Italy, Austria, Germany, the Scandinavian states, and others are active in breeding by managing stallion stations and stud farms.

Besides the professional equine centers maintained for the training activities of professional riders, numerous riding stables exist, in most cases associated with riding schools. Horses are normally stabled individually and have access to paddocks. Pasturing riding horses is not routinely done. The management of riding horses in groups is becoming more popular. This is linked to the utilization of transponder techniques for feeding concentrates. With this technology, each horse wears a transponder that is recognized when the horse walks into a feeding station. The station automatically dispenses that particular horse's concentrate ration, putting up a barrier so that no other horse can enter the station until the horse consumes its ration and exits. Having sport horses integrated in equine herds is rarely seen, but shows promise with horses that have behavior problems or other stress responses.

Animal welfare regulations are common in European countries but are differently specified. In some countries, equine husbandry is controlled by veterinarians in charge of public administration.

### **Legal Feed Regulations**

Feed regulations are in the hand of the European community. The dominating issue is food safety. Consequently, any regulation concerning feed is influenced mostly by the food safety aspect. Relevant for horse feeds are regulations for feed labeling, feed additives, undesirable substances, forbidden substances, and at least in some countries, specific regulations regarding special feed for dietetic purposes (e.g., "dietetic feed for horses with insufficiency of small-intestinal function").

### **Requirements and Feeding Recommendations**

Although we share the basic scientific facts on equine metabolism, there are some differences in feeding recommendations between countries. The net energy system is in use in some European countries like France, Italy, and Netherlands, while digestible energy (DE) is common in the others. The running review of the German feeding standards will shift towards metabolizable energy (ME), and pro-

tein requirements will be based on preceally digestible amino acids. Major differences may exist in the requirements of mares in comparison to former data. The reason is the uncertainty regarding milk yield; commonly used figures are not supported by experimental data. Regarding gestation, the intensive metabolism of the embryonic membranes suggests the requirements of pregnant mares need to be discussed again and likely be adjusted. Figures on requirements of exercising horses actually differ in protein and calcium among communications of most European countries and the actual NRC (2007). However, today there exists no uniform European description of requirements and feeding recommendations for exercising horses. The reasons for that are not differences between scientific panels regarding the evaluation of energetic for muscle activity, but difficulties in calibrating requirements. Furthermore, it can be expected that the diversity in terms of energy system (DE, ME, and NE) and protein evaluation will increase.

### Feeding Practices

Horse nutrition in Europe is characterized by limited use or limited availability of roughage. In contrast to North America, European roughage is almost always grass. Rather small quantities of alfalfa are produced in France and Italy. The restriction in using roughage for horses is due partly to traditional reasons, but a more important factor is the weather conditions for safe hay production. Several surveys show the prevalence of deficient hygienic standard in hay and straw.

The response to those limitations is silage production, particularly baled silage. Dry matter content of these silages for horse feeding is above 60% in most cases. The limited lactic acid fermentation in highly prewilted grass results in a moderate acidified material with a reduced aerobic stability after opening the bales. The mild reduction in pH to levels of about 6 in many products is insufficient to inhibit *Clostridia* species. Cases of equine botulism are often associated with the use of silage.

Hay and silage are commonly late cut. A stereotypic statement is that horses prefer more structured roughage. The resulting energy density between 9 and 10 MJ DE kg<sup>-1</sup> dry matter (DM) reflects a waste of feeding value by reason of the preferred time for harvest. In contrast to milk and beef production, it is uncommon to base the use of roughage on chemical analysis. Major reasons for laboratory-driven quality assessment of hay or silages are diseases like colic or disturbances of the respiratory tract.

Although feeding oats is traditional in Europe, this grain is not the first choice any longer. Barley and corn have become common ingredients in the diets of all horses, particularly for exercising horses. Barley and oats are commonly fed as cracked or rolled grain, whereas corn is preferred as hardly cracked or a flaked compound. In general there is—feeding mares excepted—a decrease in the use of grains as an isolated part of the diet, while the use of compound feeds is still expanding and a standard in nearly any country, even for leisure horses. It should be noted that typically roughage is fed in limited amounts of 6 to 10 kg d<sup>-1</sup> but rarely ad libitum and a concentrate is added by 1 to ~5 kg<sup>-1</sup>. The scientifically unproven principle to fix the amount of roughage neglects the perspectives to cover the caloric and nutritional needs (sodium and trace elements excepted), even for horses at a moderate level of exercise (~1.2- to 1.3-fold of maintenance).

The industrial production of concentrates for horses in Germany (for approximately 700,000 horses) has increased from 213,000 tons year<sup>-1</sup> in 1991 to 282,000 tons in 2008 (DVT, 2009). About 62% of produced grain is used for concentrate production in general. The inclusion rate of grain in compound feeds for all farm animals is ~44%; wheat and corn take the top positions. The percentage of grain in European horse compound feeds is quite higher; commonly preferred ingredients in addition to grain are sugar beet pulp, wheat bran, grass meal (artificially dehydrated), linseed, and minerals. For protein enrichment, soybean meal extracted is mostly used beside other beans and peas.

The expanding utilization of industrial-produced compound feeds in horse nutrition is remarkably fueled by modern technologies like flaking and extrusion- or expander-processing. The pelleted products share the market with nonpelleted feeds based on ingredients that are processed by one of the mentioned technologies. Those feeds, often named “muesli feeds” and comparable to breakfast cereals for humans, are often flavored with herbs or flavoring additives. From a nutritional standpoint, starch processing is the most important point. Expander-processing or flaking yields higher prececal starch digestibility and higher glycemic responses particular for barley and corn.

Accordingly, a survey of industrial compound feeds can be characterized as follows (Meyer and Coenen, 2002):

	MJ/DE	per kg crude protein, g	calcium, g
1. concentrate to complete a hay-grain combination	9.9-14.7	75-250	6-30
2. concentrate as grain substitute	9.8-12.5	90-150	4-21
3. concentrate for sport horses	10.7-14.7	85-250	6-31
4. fibrous concentrates	8.1-9.1	34-150	4-15
5. concentrates for mares	11.4-13.6	120-210	8-24
6. concentrates for growing horses	11.4-13.7	135-210	8-27

Mineral supplements show a high variation in element concentration. In most cases, they result in an oversupplementation of macrominerals and vitamins A and D. The calcium supply for an average sport horse exceeds 60 g d<sup>-1</sup>. In rations for high-performance horses, a remarkably high intake of vitamins may result from using several supplements; in some case vitamin A and D are dosed up to ten times the recommended level (Vervuert and Coenen, 2009). The risk of critical high intake via uncontrolled supplementation exists for selenium as well.

A controversial discussion was initiated during training for the Olympic Games in Hong Kong regarding salt supply. The enforced salt supply in response to sweat production is obviously not a common practice and underestimated regarding the impact on recovery and persistency of performance. However, it is scientifically not sufficiently stated how to distribute high amounts of salt in relation to sweat-producing exercise sessions.

## Conclusion

The feeding of exercising horses in Europe is characterized by an intensive use of compound feeds that include intensively processed starch. Although the deficiencies in roughage as described for Australia (Richards et al., 2006; Williamson et al., 2007) are not a major issue, it is evident that roughage is neglected. A structured control of roughage quality is lacking and the need for high-performance roughage for high-performance horses is not recognized. The strategy and management for energy and nutrient supply to sport horses in all levels of performance need to be improved. The feed industry provides a wide spectrum of compound feeds enabling precise rationing. The benefits of scientific-based rationing for horses is neglected or even refused in feeding practice. The nutrition experts are challenged to increase the transfer of knowledge into practice.

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