

EATING TIMES

Horses eat during the day as well as during the night. The main feeding times, which last for several hours, usually occur during dawn and from dusk until midnight. In the late morning and throughout the afternoon, additional smaller meals are inserted. These will be abandoned only during very hot weather and with a great plague of insects. Free-roaming equids further reduce their grazing periods during cold and wet weather. However, horses will rarely interrupt their feed intake intentionally for more than 3 or 4 hours at a time. In general, few hours pass without at least a few bites of feed being ingested. The structure and function of the equine digestive tract is adapted to this eating behavior with long feeding times and continuous feed intake. Each greater divergence from this behavior can therefore represent a health hazard and result in a gastrointestinal abnormality, i.e. colic.

EATING POSTURE AND EATING TECHNIQUE

Horses usually eat with the head held low while moving at a slow pace. The sequence of steps during grazing corresponds to that at a walk, i.e. one front hoof is placed further forward than the other in order to allow the head to reach the ground. Grasses are initially manipulated with the horse's lips and then bitten or tipped off by the incisors with a brief head jerk. Loose feed particles such as grain reach the mouth through movements of the lips and tongue. Solid feed, such as tree bark, twigs and beet, is gnawed at or bitten off directly with the incisors. The tongue is then used to move feed to the molars where it is ground by a sideways motion of the lower jaw. During the chewing period, the head is often raised in order to observe the environment. Under natural conditions, horses eat relatively slowly and chew carefully. Unpleasant tasting plants and objects taken up by accident are dropped immediately. Swallowing of foreign bodies, therefore, occurs only rarely.

Depending on the type of feed, the number of chewing movements of an average sized adult horse lies between 40 and 80 per minute. The time needed to ingest different types of feed differs depending on structure and consistency. On average, considering that significant differences among individuals exist, an average sized adult horse with healthy teeth needs about 40–50 minutes and approximately 3,500 chewing movements to ingest 1 kg (2.2 lb) of hay or straw, while it only needs about 10 minutes and 800 chewing movements to ingest 1 kg (2.2 lb)

of oats. Smaller horses and ponies generally require more time because they have a smaller chewing surface.

SOCIAL FACTORS

Under natural conditions, horses prefer to eat simultaneously with others. Frequently, a few group members will begin to eat and the others subsequently join them. Their rank-dependent distances are maintained during grazing. In general, the distance between horses will be at least 1 m (3 ft). Only very well acquainted horses will graze immediately side by side.

- Eating behavior as well as structure and function of the equine gastrointestinal tract have remained unchanged throughout the process of domestication. Consequently, horses require a continuous intake of small meals throughout most of the day.
- The horse's eating need will only be satisfied with an adequate number of chewing motions. In order to achieve these, a horse has to have access to feed for at least 12 hours of the day.
- Simultaneous feed intake together with companions represents natural equine feeding behavior.
- Synchronous feed intake requires that rank-dependent social distances be maintained.

Implications for management and handling

APPROPRIATE FEEDING TO SATISFY NUTRITIONAL AND BEHAVIORAL NEEDS

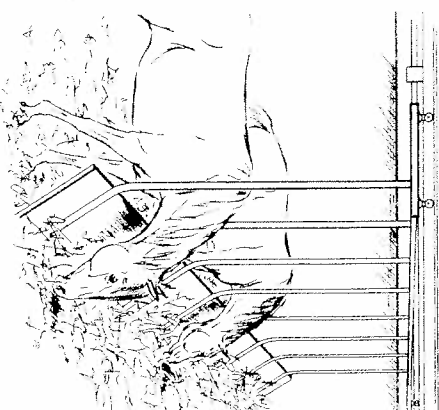
Appropriate feeding of horses has to satisfy nutritional as well as behavioral needs. Horses therefore have to receive feed containing sufficient energy, nutrients, and fiber, as well as vitamins and minerals, but feed also has to be selected in order to satisfy the eating and chewing needs. For this reason, the common feeding practice of giving only two meals a day, especially if they are relatively low in bulk, is not appropriate. As a general rule, and independent of the horse's breed and use, maintenance requirements should be met exclusively with

roughage to which vitamin and mineral supplements are added. Only that portion of the nutritional requirement that cannot be met by feeding of roughage and grass should be supplied in the form of concentrate. Pasture access throughout the day is ideal because it most closely resembles natural feed intake. If this is impossible to provide, horses should have access to feed for at least 12 hours per day, but preferably throughout the entire day. As mentioned before, horses will then split most of the total amount of feed into about 10 meals per 24-hour period. If rationed feeding is practiced, the total amount of feed given should be divided into several meals spread out over the 24-hour day. Horses that are fed mostly concentrated feeds will finish their ration quickly and will spend most of the day without feed intake, which goes against their natural behavior. Substitute behaviors such as wood chewing, increased licking, and so on, are then preprogrammed. Inadequately short feeding times and/or lack of roughage and the resulting frustration are an important predisposing factor for the development of behavioral abnormalities (p.26).

FEEDING DEVICES

As horses mostly take up grass from the ground, they naturally hold their heads in a lowered position for more than half of the day. This posture favors the flow of saliva and is of advantage for the development of a strong back. For this reason, feeding installations should allow feed intake in a natural body posture. Roughage can be offered on the ground or, preferably, from the clean barn aisle floor that is accessible through bars (set 30–35 cm (12–14 in) apart). The latter provides an additional space gain because horses can reach through the bars into the barn aisle (p.80). Mangers that are installed close to the ground are also suitable as long as they are constructed in a manner that prevents injury from occurring (distance between bars at most 6 cm (2.4 in)). Horses are then occupied with feed intake for a longer time, less feed is lost and the risk of parasite reinfection via manure-soiled bedding is decreased (38). Mangers should not be installed too high. For large-breed horses, feed should be placed at a height of about 50–60 cm (19–24 in) (0.35 × wh). When using feeding gates and feeding stalls, it has to be considered that they do not allow the usual eating stance with the forelegs set apart. Feed should therefore be positioned at a height of about 20–30 cm (8–12 in) above ground to prevent the horse from putting too much strain on its forelegs.

Automated feeding devices have evaluated and proven in a practical sense these allow distribution of concentrate portions over several meals throughout the day and are now available for individual as well as group management situations. In addition, the advantage that the caretaker is no longer by a feeding schedule, these devices are preferable from a standpoint of nutrition physiology. From an ethological view, these systems also offer advantages as they do not create additional feed-related aggression. For this reason, stationary systems that allow synchronous eating are preferred compared to computer-controlled wagons that distribute feed consecutively. In group management situations, all horses use one feeding station and only asynchronous eating is possible. Preventive measures to avoid an increased occurrence of social conditions are discussed in the following section.



38 The rolling rack (RAL system) allows horse group management systems to consume roughage under hygienic conditions all day long. The rack is anchored on rails, which results in a slight pendulum motion, and is pushed against the feed trough by animals; bar distance 30 cm (12 in), total width 350 cm (11.5 ft).

Tips for the feeding of "easy keepers"

Slow down feed intake

Eating time can be lengthened by up to 2 hours without increasing feed intake by use of special feeding devices such as economy racks (39). With this system, which can be installed in individual stalls as well as in feeding areas within group paddocks, closely spaced (approximately 5 cm (2 in)) bars hinder feed intake and therefore slow it down (Table 4).

Lower nutrient/energy content

For easy keepers, the energy supply per horse should be reduced by about 10% from the usual recommendations. One can achieve this by offering an increased amount of less palatable, low-energy feed such as late-cut hay and straw, or by mixing these feeds with more palatable ones (40). Because of the risk of impaction colic with excessive straw feeding, it is recommended to increase the amount of straw in the ration slowly and to alternate straw rations with other feeds such as hay or grass throughout the day. With these initial precautions, straw can soon be offered *ad libitum*. With particularly sensitive horses, it is advisable to limit the amount of straw offered to 0.5 kg/100 kg bodyweight (0.5 lb/100 lb) per day. The upper limit for straw feeding in any horse is 1.2 kg/100 kg bodyweight (1.2 lb/100 lb). Similar measures apply when feeding late-cut, coarse, and straw-like hay.

Partitioned pastures or follow-up grazing

It is advisable to partially cut down pastures intended for easy keepers; however, they should not be cut too short. Partitioned pastures are ideal (41). In the easiest case, a small new portion is added to the pasture each day by means of an electric fence. In this way, even easy keeper horses can be treated appropriately by giving them access to fresh grass every day.

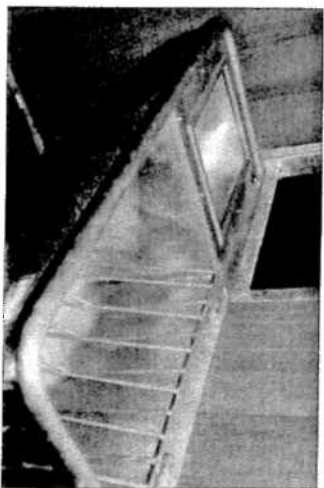
Table 4 Eating time and speed of ingestion when using the economy feeder with different bar distances (Pirckelmann 1991)

| Bar distance (mm) | Measuring period (days) | Consumption per day (kg) | Eating time per day (hours) | Speed of ingestion (g/min) |
|-------------------|-------------------------|--------------------------|-----------------------------|----------------------------|
| 165 | 5.5 | 7.4 | 4.9 | 25 |
| 55 | 6.7 | 7.7 | 7.5 | 17 |
| 55 | 4.2 | 5.9 | 7.4 | 13 |

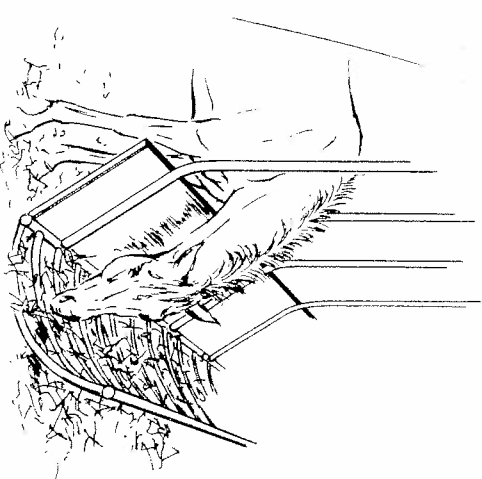
PROBLEM - THE "EASY KEEPER"

Many pony and draft breeds appear to digest feed better than most of the larger horse breeds. They are therefore commonly denoted as "easy keepers". The reason for their higher weight gain is not superior digestion but the comparatively small energy expenditure for maintenance. This mostly has to be attributed to better skin insulation (dense hair coat, subcutaneous fat) and to behavior (quiet temperament). Even on pastures with average plant growth, these horses easily get too fat because their feed intake remains the same independent of nutrient supply. They also gain weight when fed roughage as soon as

hay and straw are available to them for extended periods of time. In practice, one attempts to prevent excessive feed intake by limiting the duration of feed intake. Many animals therefore only have feed available for few hours of the day. This feeding regimen is not appropriate! Digestive and, most importantly, behavioral problems originate with this practice. The correct approach is to decrease the nutrient and energy supply without cutting back on eating time. The most important objective with any feeding regimen has to be the satisfaction of the horse's chewing need. The only way to satisfy this is by a sufficiently long duration of feed intake.



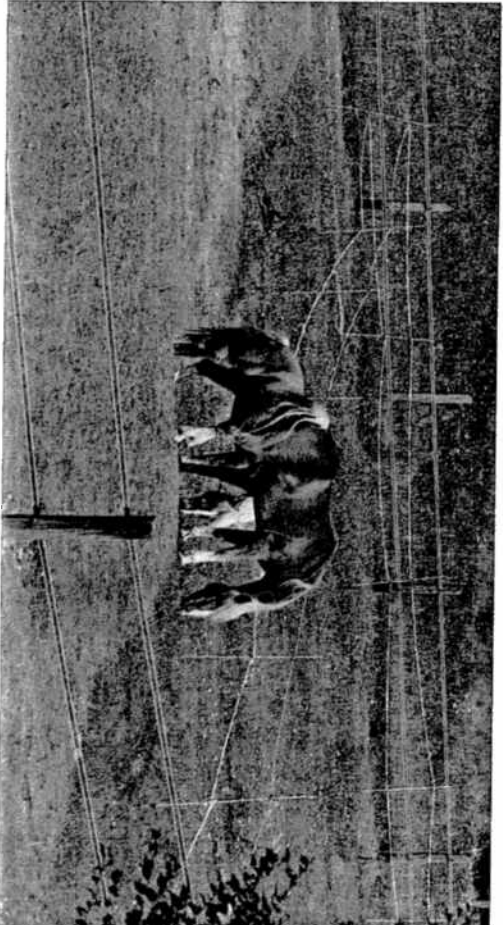
39 The adjustable guard in the economy rack ensures slower feed intake.



STRESS-FREE FEEDING
Feed intake without conflict is only possible if horses have the opportunity to maintain rank-dependent social distances. Current knowledge suggests that an individual provides an adequate individual distance to neighboring horses in order to undisturbed eating. A sufficiently large stall area of at least (2 x wh)², is a prerequisite. There are horses, often those that are "bred", that claim an especially large individual distance for themselves. These horses are recognized by their frequent kicking against walls, biting of bars, and similar behavior. Answer to this problem is to provide a larger stall or to put these horses at the end of a row of stalls where only one direct neighbor is present.

In a group management situation especially difficult to feed in a manner that allows everyone, including the horse of rank, to satisfy their nutritional requirements and eat without stress. Based on their social behavior, higher-ranked horses are allowed to eat first in a group situation. Horses can become so dominant and possessive of the feeding troughs that other members can only eat in fear and under or not at all. For this reason, at least one space has to be available per horse. Furthermore, bottlenecks at feed troughs have to be avoided and sufficient space for lower ranked horses must be provided.

40 For "easy keepers", which are designed to have mixed in with their hay, the front guard is recommended as it prevents a separation of hay and straw.



41 With the help of pasture partitioning, fresh grass can be offered daily in adequate rations.