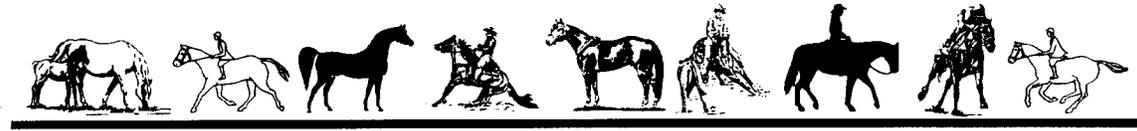


**TEXAS A&M UNIVERSITY
DEPARTMENT OF ANIMAL SCIENCE
EQUINE SCIENCES PROGRAM**



FEEDING MANAGEMENT POINTS FOR TEXAS HORSE OWNERS

D. Douglas Householder, Ph.D., Pete G. Gibbs, Ph.D.
Gary D. Potter, Ph.D., and Karen E. Davison, Ph.D.

Once a horseman understands the nutrient requirements of various classes of horses and has selected feeds to meet these requirements, a certain amount of skill and sound judgement must be employed in developing a feeding management program. There are a number of considerations in the husbandry or "art" of feeding horses. Most of these considerations are based on the knowledge of a horse's nutrient requirements, eating behavior, and an understanding of the anatomy and physiology of the horse's digestive tract. This paper deals with:

1. feeding by class and condition
2. bodyweight estimation and condition scoring,
3. feeding hay to horses,
4. feeding concentrates safely and lastly,
5. managing eating behavior of horses.

Feed horses by class. Horses require differing amounts of nutrients in their daily diets depending upon their nutritional class or status in life. For this discussion, the classes are mature idle, producing, working or growing horses. Dividing horses into classes relative to nutrient requirements is the first step in designing a workable feeding management program. This approach helps a horse owner meet each horse's nutrient requirements in the most manageable and economical fashion.

Utilize practical feeding plans. When feeding by class, managers usually select one of two basic feeding plans, depending on available hays, concentrate feeds and management. Plan A is to feed the same roughage source (e.g. grass hay), then feed from two to four different concentrate feeds varying in protein and other

nutrients. Plan B is to feed one well balanced concentrate to all horses, and then feed either legume or grass hay. Many farms and ranches use plan B due to its simplicity.

Feed Horses According to Body Weight. Table I shows recommended daily feed intakes by horses as a percent of body weight.

Note that forage and concentrate intakes are given in ranges. To use this table, a horseowner must know the class of horse being fed and the horse's body weight. When determining body weights, the most accurate method is to weigh the horse on a scale. Many large breeding farms and training stables routinely weigh horses and feed intakes can be adjusted to maintain desired body weights. Where weighing is impractical, other methods such as, visual estimation, weight tapes or body measurement formulas can be used. With regard to skills of estimating weight, one study reported that 88% of horsemen, many of them professionals, underestimated the weight of five horses by an average of over 180 lbs¹. Probably the most commonly used technique for estimation of body weight is a heart girth tape. Heartgirth tapes are available from feed dealers, veterinarians and livestock supply companies. When used according to instructions, these tapes are reasonably accurate. Another method for estimating a horse's body weight is use of a body weight equation. One equation² is:

$$W = (HG^2 \times BL) \div 330$$

Table I. Recommended Daily Feed Intakes by Horses As Percent of Body Weights*.

Class	Forage	Concentrate	Total
Mature (Idle)	1.5 - 2.0	0 - 0.5	1.5 - 2.0
Late Gestation (Mares)	1.0 - 1.5	0.5 - 1.0	1.5 - 2.0
Lactation (Mares)	1.0 - 2.0	1.0 - 2.0	2.0 - 3.0
Working Horses (L,M,H)**	0.8 - 2.0	0.5 - 2.0	1.5 - 3.0
Growing (Weanlings)	0.5 - 1.0	1.5 - 3.0	2.0 - 3.0
Growing (Yearlings)	1.0 - 1.5	1.0 - 2.0	1.8 - 3.0

*Adapted from NRC - Nutrient Requirements of Horses¹³.

**Depends on intensity of work.

where W = weight in lbs, HG = heart girth in inches, and BL = body length in inches. For example, using this equation, a horse with a 67 in. heart girth and a 65 in. body length (point of shoulder to point of hip) would weigh 884 lbs.

Feed Horses To Condition Scores. Feeding horses according to body weight is ideal; however, most horsemen should use a horse's condition (or degree of fat cover) as a feeding guide. Research has shown that the amount of body fat, which is actually stored energy, influences many physiological functions. Fertility in broodmares³ is very predictably influenced by degree of body fat as is performance^{4,5} in riding horses. Progressive broodmare managers and horse trainers feed their horses to attain workable condition scores, as have been determined from research studies.^{3,4,5} Condition scoring is a procedure where horsemen first visually observe and/or feel the fat cover at six body sites (back, ribs at midbarrel, neck, behind the shoulders at the forerib, withers and tailhead). These estimates of fat are then compared to the descriptions on a condition scorecard, and a condition score is determined for the horse. Table II is a condition score card. When condition scoring horses, don't be fooled by long hair or confuse muscle bulk and tone for fat. Horsemen should make feed adjustments according to condition scores so they can feed their horses to their optimal condition, to subsequently achieve maximum reproductive and performance efficiency.

Feed Adequate Long-Stemmed Roughage. As a nonruminant herbivore, the horse innately displays a need to forage or chew long roughage. A certain amount of long-stemmed roughage, a minimum of .75% - 1.00% of a horse's body weight daily, generally satisfies a horse's roughage needs and allows normal activity of the digestive tract.¹³ Horses grazing abundant good-quality pastures consume enough green growing forage to meet their daily roughage requirement. Horses maintained in dry lots or stalls, however, receive only what roughage is fed to them by their owners. When adequate long-stemmed roughage is fed, horses appear satisfied and stall behaviors are normal. When horses don't receive adequate long stemmed roughage over a period of time, they develop behaviors such as chewing wood, eating bedding, and in some cases eating feces⁶. Horses maintained in groups often chew manes and tails of their pen mates. Horses that chew wood because of lack of long roughage, exposure to easily accessible softwood in stalls, or from boredom, may develop a vice called cribbing⁶. Cribbers hook their upper incisor teeth over a solid object (e.g. manger, trough, drinker) and pull back swallowing gulps of air. Cribbing is extremely annoying, destroys stall equipment, and is virtually impossible to stop. Cribbers can also develop gaseous colic if excessively large quantities of air are ingested. Wood chewing and/or the habit of cribbing may be mimicked by other horses. To prevent horses from ever starting to chew wood, adequate high-quality, long-stemmed roughage should be provided

Table II. Condition Scorecard*.

	Score	Back	Ribs (mid barrel)	Neck	Shoulder (fore rib)	Withers	Tailhead
Poor	1	very prominent vertebrae	very prominent	extremely thin	prominent	prominent	very prominent
very thin	2	prominent vertebrae	prominent	very thin	very thin	very thin	very thin
thin	3	vertebrae - fat 1/2 way up	see easily	thin	thin	thin	prominent
moderately thin	4	negative crease	see slight outline	moderately thin	moderately thin	moderately thin	some fat
moderate	5	level (no crease)	not see easily feel	blend into shoulder	blend smoothly into body	rounded	moderate fat
moderately fleshy	6	slight crease	not see feel	little fat	little fat	little fat	moderate fat
fleshy	7	average crease	barely feel	average fat	average fat	average fat	fleshy fat
fat	8	obvious crease	difficult to feel	fat	flush behind	fat filled	fat
extremely fat	9	very obvious crease	not feel (patchy fat)	bulging fat	bulging fat	bulging fat	bulging fat

*Adapted from NRC - Nutrient Requirements of Horses¹³.

each day. Also, when constructing stalls, use of hardwood lumbers, painting exposed lumber with creosote, and/or installing metal sashing over the corners of easy-to-chew boards can prevent wood chewing. Some horse owners feed "complete feeds" where both hay and concentrate has been incorporated into a pellet. Complete feeds can meet a portion of a horse's daily long-stemmed roughage requirement; however, some long-stemmed roughage should be fed daily with the complete feed to prevent wood chewing.

Store Hay To Maintain Quality. Protect stored hay from moisture. When storing square bales in buildings with cement floors, stack hay on pallets. Where dirt floors exist, even more insulation from ground moisture will be needed. Some farms or ranches feed round bales. When storing round bales outside, take precautions to minimize deterioration of the hay from both rain and ground moisture. To minimize rain damage, lay bales on their side and push them tightly against each other. Placing round bales up on crossties, old tires or up on gravel or dirt terraces minimizes the "wicking effect", which is the uptake of ground moisture into the bale.⁷

Feed Hay From Well Designed Mangers. Hay should be fed from some type of feeder or manger designed and located to minimize the ingestion of dirt, sand and/or fecal material. Hay feeders should be designed to keep the leaves, the most nutritious part of hay, from falling on the ground and mounted where they are easy to fill and safe for horses. Combination hay and concentrate feeders are popular as they are designed with a tray to catch hay leaves, can be filled from outside stalls and are safe when mounted at chest height. Ground-level corner-type hay mangers are also popular among horsemen. When on the road with horses, horse owners often use hay nets or bags. Hay nets should be tied securely at eye height and to prevent horses from getting their feet in the net. Hay bags minimize leaf loss and are easier to fill than hay nets. In certain situations, horses must be fed hay in the pasture. Again combination hay and grain feeders are ideal for horses on pasture. Feeding hay on the ground is not ideal, but is acceptable if the ground is dry. Feeding round bales is simple and can be economical. Most cattle ranches use metal rings encircling round bales to decrease wastage. The

use of round bale rings with horses may cause injuries; therefore, one should use caution while using round bale rings.

Store Concentrates To Maintain Quality.

Concentrate feeds should be stored to keep them dry and protected from insects and rodents. Stack sacked-feed on pallets to keep it dry. Bins, barrels with tight lids and feed boxes can protect feeds. Feed rooms should have doors, yet be well ventilated inside when doors are closed. All feed rooms should contain a small scale to weigh feeds. Many ranches, farms or stables store feeds or whole grains in bulk bins. Bins should be kept clean and dry. When storing commercial feeds, don't store feed over 1 month to maintain feed freshness. Insects can be a problem in bulk-stored grain in certain midwestern and southern states in the United States. Check with your local County Extension Agent for information on controlling insects in bulk-stored grains.

Provide Feeds By Weight Not Volume.

Horseman should feed by weights of feed because standard volumes of feedstuffs do not weigh the same. For example, the horse owner's universal feed measuring dispenser is the 3 lb. coffee can! When full of 32 lb./bu. oats, the can weighs 2 1/2 lbs.; 38 lb./bu. oats, 4 lbs.; corn or pellets, 5 lbs. etc. Concentrates do not weigh the same! A block of grass hay may appear twice as large as a block of alfalfa hay, but the grass hay may weigh the same or even less than the alfalfa. Ideally concentrates and hay, especially concentrates, should be weighed at each feeding as is practiced by managers on progressive ranches and farms. Always check feed weights, especially when new or different feeds or hays are purchased. Learn the approximate weights of different size blocks of hay and the differing weights of various concentrates. Mark cans and other feed dispensing containers to standardize amounts of feed being fed.

Never Feed More Than 0.75% Of Body Weight At Any One Feeding. How much concentrate can safely be fed at one time? A practical thumb rule is to never feed more than 0.75% of a horse's body weight in concentrate at any one feeding¹⁴. For example, a 1,000 lb. horse should never be fed more than 7.5 lbs. of concentrate at any one feeding. Generally, this means that mature idle horses could be fed concentrate once

daily. Growing horses, milking mares, or moderate working horses; requiring approximately twice as much concentrate, should be fed twice daily. In certain situations (e.g. hard working performance horses or extremely thin milking mares), where as much as 15-20 lbs. of concentrate must be fed per day, the concentrate should be fed in at least three and preferably more feedings each day.

Space Multiple Feedings Throughout The Day.

When multiple feedings are necessary, space feedings equally throughout a 24 hour time period. This gives the digestive tract equal time to digest each meal, which helps in preventing digestive disorders. Feeding times should also take into account work. For example, on many well managed race horse farms where horses are worked in the mornings, the 5:00 to 6:00 a.m. feeding consists of one third of a horse's daily concentrate allowance and only a small portion of the daily hay allowance. Larger proportions of hay are then fed with the concentrate at the noon and late afternoon feedings when horses have more time to digest the hay.

Feed Daily At Set Feeding Times. Horses are creatures of habit and respond positively or negatively to when they are fed. Horses fed quality feeds on a consistent schedule are less likely to go off feed and seldom develop stall vices. On the other hand, horses fed on erratic schedules usually appear annoyed in the stalls and over time develop stall vices such as digging, kicking or raking their teeth on stall walls. Digestive disorders can also be caused by overly hungry horses bolting their feed. Horsemen should set feeding times and feed at those times every day, holidays and Sundays, 365 days per year. Remember, each interfeeding interval must be the same amount each time.

Avoid Abrupt Ration Changes. Often it becomes necessary to make changes in amounts, types or forms of feedstuffs. In situations where dramatic increases in concentrate quantities are necessary (e.g. fattening thin milking mares), increase feed intake gradually over a 10-day to 2-week period of time so the digestive tract can adjust. When changing feedstuffs, some changes can be made almost immediately; some require a few days; and others will require a week or longer to assure a safe changeover. Changing from one textured concentrate to

another, when both feeds have approximately equal energy densities, is only a slight change and can be done over a few days. However, changing horses from a ration high in oats to a ration high in corn represents a significantly greater change in energy concentration between the two rations. Take a week or more to make this type ration change. Changing physical forms of feeds, such as from a textured feed to a pelleted feed, should be done over a 5-to 7-day period of time. Fat and/or oils being added to rations, depending on the level added, should be increased gradually to maintain consumption by horses. When changing from grass hay to a lush legume, take 3 to 4 days to complete the change. When changing horses from grass hay to a lush pasture, turn horses out for only a few hours for 2-3 days, then half a day for 2-3 days, then out completely if possible. If this gradual changeover is not practical, fill horses up on hay before turning them into the lush pasture.

Check Daily For Refusals. Occasionally horses do not "clean up" or eat all their hay and/or concentrate. Feed refusals suggest the horse was overfed, fed the correct amount but something was wrong with the feed or hay, has limited access to water, is sick or possibly has teeth problems. Remove uneaten or spoiled feed and/or hay from feeders and mangers and determine the cause of feed refusal.

Avoid Cafeteria Style Feeding of Minerals. Cereal grain rations mixed at the farm often need to be supplemented with calcium and/or other minerals to meet the requirements of certain classes of horses. Some horse owners feed calcium and/or other minerals free choice cafeteria style, in a separate feeder, assuming the horse will balance his own ration. Research indicates that horses do not possess nutritional wisdom for calcium and/or phosphorus, meaning they don't know which and how much of each mineral they require⁸. When mineral supplementation is necessary, purchase a balanced mineral mixture including salt, in loose or pellet form, and topdress it on the grain ration, at the manufacturer's recommendations.

Don't Supplement Balanced Rations. Specific commercial concentrates are formulated to meet

the requirements of specific classes of horses. Surveys have indicated that from 21 - 52% of Texas horse owners however, topdress a protein, vitamin, and/or mineral supplement on their commercial rations^{a,b}. This practice is expensive and can cause serious nutrient imbalance and toxicity problems. Supplements are needed only when concentrates of unknown or questionable quality are fed. If supplements are fed, feed according the manufacturers recommendations.

Refrain From Diluting Balanced Rations. Nutrient balance within a feed is important for all classes of horses, particularly for fast-growing young, horses and hard- working horses. Feed manufacturers formulate feeds with correct and precise nutrient balances. One survey revealed that 40% of Texas horse owners, who feed commercially manufactured feeds diluted or "cut" these feeds with some cereal grain, usually oats, prior to feeding^a. Diluting a commercially manufactured feed changes its nutrient balance and can decrease its nutritional value for horses.

Provide Salt For All Horses. Pastured horses not receiving commercial feeds, should always have free choice access to TM salt. TM salt should be fed in a clean container, preferably protected from the weather. In humid climates, blocks are acceptable as they crumble allowing horses to easily consume their salt requirement. In more arid climates, blocks won't crumble; therefore, loose salt is recommended. Stalled horses being fed commercially manufactured feeds, usually containing 0.5% - 1.0% added salt, usually won't need supplemental salt¹³. The exception to this is the working horse that is sweating profusely each day and may require more salt than he is eating in his feed. Provide these horses sufficient salt to equal 1% of the daily ration.

Provide All Horses Clean Fresh Water. The mature idle 1,000 lb. horse will drink approximately 10 to 12 gallons of water per day; however, if milking or sweating profusely, more water will be consumed. Some horse owners water from buckets so they can monitor daily how much water their horses are drinking.

^a Householder D.D., and P.G. Gibbs. MSD AgVet/TAEX Texas Horse Owners Survey (feeding practices). Unpublished data. December 1990.

^b Gibbs P.G. Texas Grain Sorghum Producers survey of feeding practices. Unpublished data. March 1990.

Bucket watering is time consuming; therefore, automatic waterers have become popular among horsemen. Automatic waterers should be installed with no exposed hoses for inquisitive horses to pull loose. Dirt or partially chewed grain and/or hay can accumulate in waterers, the latter souring the water. Check automatic waterers daily to be sure they are working properly and that the water is clean and fresh. Provide clean fresh water to all horses ad libitum each day, except to the extremely hot horse. The hot horse should receive plenty of water, but only a few swallows of water at a time to avoid potential "water colic".

Recognize Feeding Related Behavior Problems.

Feeding horses individually is optimal, particularly for those horses requiring large quantities of feed such as growing or working horses. In certain management situations, individual feeding is not feasible; therefore, horses must be fed together. Feeding time can cause some characteristic agonistic or abnormal ingestive behaviors to appear in horses^{9,10}. These behaviors may result in injuries to owners, horses, and/or damage to facilities and/or can lead to poor digestion. These feeding time behaviors are seen in both stall and pasture settings. To manage agonistic or dominance behavior, minimize close contact competition between horses when they are eating.

Design Stall Feeding Situations To Minimize Competition.

Where feeders are located in adjacent corners, solid full length partitions between stalls, or partial partitions at the feed boxes, will discourage horses from "picking" at each other at feeding time. Mounting feeders at the center front of stalls eliminates a great deal of the feeding time competition between horses.

Encourage Aggressive Horses To Eat Slowly.

Some horses are aggressive eaters and "bolt" mouthfuls of feed to the extent the feed is not thoroughly chewed before swallowed. Some horses root feed out of their troughs and/or drop feed as they walk away from their feeders to watch activity in the barn aisle. Horses can be encouraged to eat slower by feeding them in large shallow troughs, placing bricks or softball size rocks in troughs, or by feeding extruded feeds¹¹ or mixing chopped hay¹² with the concentrate. Rings mounted inside troughs or troughs with lipped tops or grooved sides discourage horses from rooting feed out of

troughs. Mounting feed troughs where horses can watch routine barn activity while eating minimizes feed wastage.

Group Feeding Should Account For Dominance

Heirarchies. Foals and growing horses can usually be fed by groups with little problem as dominance heirarchies have not yet become strongly established⁹. With increasing age, however, horses develop "pecking orders" and feeding time will cause these aggressive behaviors to be manifested. When group feeding older horses, minimize close contact by providing separate feeders for all horses, plus one or two extra feeders. Place all feeders in open areas, and space them 40 to 50 feet apart. Use feeders with no sharp points or projecting edges to prevent injuries. Old, crippled, foundered, or blind horses require special management and can be grouped together for feeding.

Protect Trees From Horses Chewing Bark.

Horses on pastures, even those receiving ample roughage and exercise and eating well balanced rations, often chew the bark off trees. This behavior may be related to boredom, changes in weather or possibly the taste of the bark of certain trees at specific times of the year¹⁰. Wrap trees loosely with old fence wire to prevent excessive removal of bark which can kill trees.

Routinely Exercise Stalled Horses. Routine exercise is important to maintain optimal eating behavior in stalled horses. Stalled horses, especially those fed large quantities of feed, should be exercised daily to maintain regular eating habits, desirable stall behavior and general health. Exercise can be provided by riding, lounging, ponying, exercising on a mechanical walker or treadmill, or by turning horses out in turnout traps.

REFERENCES

1. Johnson E L, Asquith R L, Kivipelto J. Accuracy of weight determination of equids by visual determination. In Proceedings. 11th ENPS Symp. 1998; 240.
2. Carroll C L, Huntington P J. Body condition scoring and weight estimation of

- horses. *Equine Vet J.* 1988; 20(1):41-45.
3. Henneke D R, Potter G D, Kreider J L. Body conditioning during pregnancy and lactation and reproductive efficiency of mares. *Therio* 1984; 21:897, 1984
4. Potter G D, Webb S P, Evans J W et al. Digestible energy requirements for work and maintenance of horses fed conventional and fat-supplemented diets. *J. Equine Vet Sci* 1990; 10(3):214-218.
5. Scott B D, Potter G D, Green L W, et al. Efficiency of a fat-supplemented diet to reduce thermal stress and maintain muscle stores in exercising Thoroughbred horses. In *Proceedings. 12th ENPS Symp.* 1991; 1-6.
6. Evans J W. *Horses, a guide to selection, care and enjoyment.* 2nd ed. New York, New York: W. H. Freeman and Company, 1989.
7. Reeves S A, Bade D H. *Feeding and storing hay.* Texas Agricultural Extension Service, TAMU, 1988.
8. Schryver H F, Van Wie S, Daniluk P et al. Voluntary intake of calcium by horses and ponies fed a calcium deficient diet. *J. Equine Med Surg* 1987; 2:337.
9. Yeates B F. Recognition and use of social order in horse farm management. In *Proceedings. TAMU Horse Short Course* 1974;1.
10. Potter G D, Yeates B F. Behavioral Principles of Training and Management. In: Evans J W, Bolton A, Hintz H F and Van Vleck L D, ed. *The Horse, USA:* W. H. Freeman and Company, 1977; 607-629.
11. Hintz H F, Scott J, Soderholm L V et al. Extruded feeds for horses. In *Proceedings 9th ENPS Symp* 1985;174.
12. Hintz H F. Feeding Behavior. *Equine Vet Data* 1989; 10:156.
13. National Research Council. *Nutrient Requirements of Domestic Animals, Nutrient Requirements of Horses*, 5th ed. Washington, D.C.: National Academy Press, 1989.
14. Potter G D, Arnold F F, Householder D D et al. Digestion of starch in the small or large intestine of the equine. In *Proceedings. 1st European Conference on Horse Nutrition* 1992; 119-123.

