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Feeding Young Horses for Sound Development

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Introduction

To a large extent, industry trends dictate methods used to manage horses. Rapid growth and development often is important for halter futurity contenders and for foals entering race training as yearlings, **and while size itself is not a marketing factor for some disciplines such as cutting and reining, rigors of early training place great demands on young skeletal systems**. Horse owners realize that young horses' marketing or performance potentials often hinge on evidence of significant early development.

Even without the demands of marketing or competition, sound early development is important for longevity and usefulness for all types of foals. Horse owners should decide whether to feed young horses for moderate or for rapid growth (**Fig. 1**). Either growth rate allows mature horses to grow as big as their genetic bases will allow. However, rapidly growing horses reach their mature height and weight much earlier than do those fed to produce moderate growth rates.

Limited data from Texas horse-farm owners suggests that they make a profit from 42 percent of their young horses, while they break even on 20 percent and lose money on 21 percent of them. The largest profit margin appears to come from the 14 percent of young horses that are sold.[12] Although most evidence suggests that horse owners cannot starve profit out of young horses by scrimping on their nutrition, as many as 44 percent of farms fail to meet known nutrient requirements for young horses, particularly for weanlings.

Sound feeding management, including feeding a balanced nutrient supply, is crucial to improving profit through more marketable and useful horses. With such an approach, problems may still emerge from time to time, but sound early management can be expected to make a difference in young horses' development, regardless of the animals' intended purpose.

Some young horses must achieve rapid early growth to be competitive.

Developmental Problems

Bone and joint problems known as developmental orthopedic diseases (DOD) are a major concern of horse owners.[29] DOD appears to be heritable.[22] Horses with genetic predispositions for large mature size often develop skeletal problems regardless of how they are managed. However, management may contribute to skeletal problems, since nutrient imbalances and excessive forced exercise of confined horses also apparently can lead to DOD.[36]

The frequency of DOD in horses genetically predisposed to skeletal problems has led to the misconception that horses fed to reach full growth at a young age will become unsound, **but the adage that young horses are being grown too fast is not necessarily true. Two studies involving over 1400 young horses showed no relationship between rate of growth and incidence of developmental problems.[23,50] However, when young horses are managed for rapid early growth, nutrition and exercise programs require careful administration to ensure structural soundness as horses mature.**

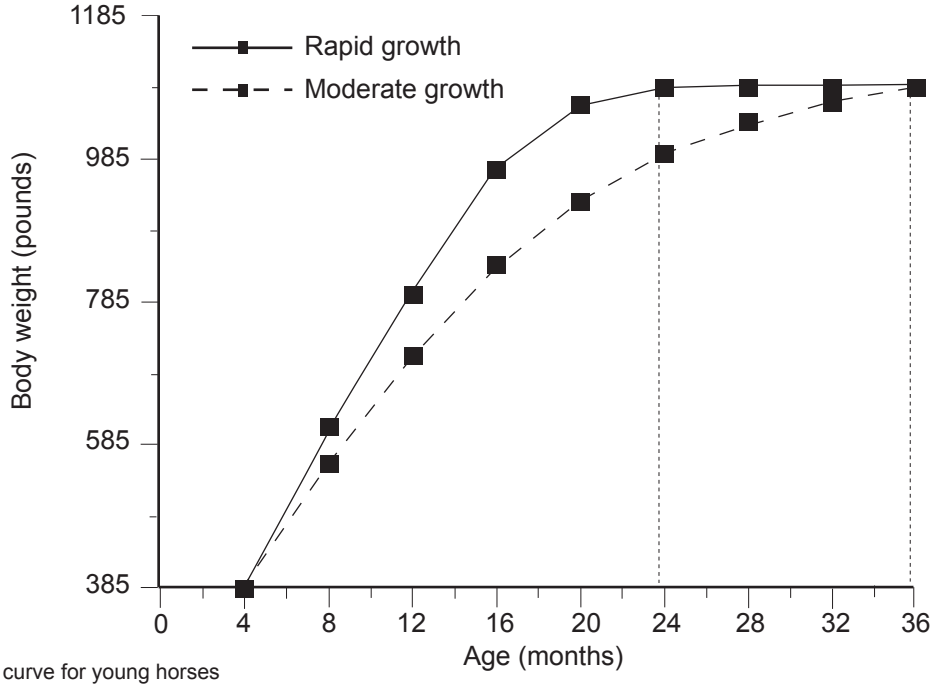

Figure 1. Example growth curve for young horses

The DOD complex includes epiphysitis, osteochondrosis and **juvenile arthritis**, among other disorders.[37] Common DOD symptoms include enlargement and deformities of ankles, knees and hocks, as well as contracted tendons ("pulling up") in the pasterns. Although bone radiographs indicate skeletal irregularities in many young horses,[31] some horses never develop visible signs of DOD; others have appearance or lameness problems interfering with growth and performance. **Some such problems are developmental, while others are acquired as growth progresses.**[37]

To help prevent or minimize skeletal problems, diets for young horses should be formulated carefully to contain an adequate supply of major nutrients **(Table 1)** important for promoting growth.[31] Nutrients such as protein, calcium, phosphorus and other minerals and vitamins must be provided in correct amounts relative to each other and must be in balance with the amounts of energy ("fuel") a horse eats. Inadequate concentrations of protein, minerals and vitamins relative to energy concentration may cause DOD in young horses. Protein quality, which means amino acid profile, is more important than total protein for growth promotion.[32]

Deficiencies in certain trace minerals may contribute to DOD.[8,29] The trace mineral needs of growing horses are not completely known; young horses should be fed concentrate feeds that contain adequate, balanced amounts of trace minerals and salt. High-quality commercial feeds usually contain adequate trace minerals, but horse owners who prepare their own feed mixes will need to add trace mineral salt or vitamin/trace mineral premixes to concentrate diets.

Although other factors may have been involved in growth problems observed, a survey of 19 Ohio and Kentucky breeding farms suggests that foals may require more copper than previously recommended.[25] In another study, three levels of copper were fed to weanlings with no effect on wither height or on bone density.[47] **More recently, both veterinarians and owners have been cautioned that copper intake has been overemphasized and that not enough attention has been given to intake of adequate energy and high-quality protein.**[7]

Toxic amounts of zinc appear to interfere with copper absorption, but varying copper:zinc ratios routinely seen in normal diets do not interfere with copper absorption.[10,54] **Zinc:copper ratios of 4:1 or 5:1 are recommended for young, growing horses.**[29,31]

Growing horses fed high-energy diets with nutrient imbalances may gain weight faster than their bones can develop;[34,38] such above-average weight gains may not be compatible with optimal bone-mineral deposition.[33,48] Although feeding unbalanced high-energy diets may contribute to skeletal problems,[16] research has not shown that high-protein diets cause DOD.[3] Instead, nutrient imbalances, rather than high-energy diets, appear to cause skeletal problems.[2,18,43] Gains in height decrease when weanlings and yearlings are fed diets low in protein, calcium and phosphorus.[14,34] Conversely, young horses gain more height, weight and heart girth when fed high-energy diets with suitable amounts of protein and minerals.[35] Limiting dietary energy limits growth; available energy enhances growth. However, horses fed for faster growth have greater total requirements for protein, minerals and other nutrients than horses fed for slower growth.[31]

Table 1. Daily nutrient requirements of growing horses (1,100 pounds mature weight) (Adapted from National Research Council, 1989.)

Class	Digestible energy (Mcals)	Crude protein (lbs.)	Lysine (gms)	Calcium (gms)	Phosphorus (gms)	Magnesium (gms)	Vit. A (IUs)
Weanling (4 months)	14.4	1.60	30	34	19	3.7	8,000
Weanling (6 months)							
Moderate growth	15.0	1.65	32	29	16	4.0	10,000
Rapid growth	17.2	1.90	36	36	20	4.3	10,000
Yearling (12 months)							
Moderate growth	18.9	1.90	36	29	16	5.5	15,000
Rapid growth	21.3	2.10	40	34	19	5.7	15,000
Long yearling (18 months)							
Not in training	19.8	2.0	38	27	15	6.4	18,000
In training	26.5	2.60	50	48*	27*	17.2*	18,000

*Based on Stephens et al., 2004.

Characteristics of Particular Feedstuffs and Potential Problems

Careful selection of high-quality feedstuffs and accurate ration formulation ensures that a horse's juvenile skeleton adequately develops as its body weight increases, which is extremely important when young horses are receiving forced exercise. Horses being fitted and conditioned for sales, futurities and pre-race training remodel bone in response to work. Accurate ration formulation and feeding can't guarantee the absence of DOD but at least will eliminate possible nutritional causes of such problems.

Balanced concentrates often are formulated from energy feeds such as oats, corn, barley and, to some extent, sorghum (milo). Any energy source used in horse feed must be accompanied by sufficient high-quality protein and by proper proportions of necessary vitamins and minerals. In a practice called "cutting," commercial feeds are mixed with another cereal grain like oats or corn,[15] altering the nutrient:energy balance of the final diet. Cutting ultimately can contribute to growth abnormalities. Horse owners also should be aware that moldy-corn poisoning can kill horses. Rations should be formulated only with high-quality corn, and corn screenings should never be used.[40]

Protein supplements such as soybean, cottonseed and linseed meals may be used in formulated rations. However, soybean meal's higher lysine concentration provides better growth rates than does cottonseed meal when both are fed in equal amounts.[28,39] Cottonseed meal can be used if at least half of the total supplemental protein will come from soybean meal or if synthetic amino acids will be used to correct specific amino acid deficiencies.

Some feeds containing 14 percent crude protein are well balanced for broodmares but do not contain sufficient amino acids for foals and weanlings. For young horses, lysine is the number one growth-limiting amino acid. Lysine is more important than energy or protein in terms of influence on body-weight-gain in weanlings.[32] Many feed companies have added synthetic lysine, knowing that some farms will feed the same feed to both mares and foals. Horse owners should make sure such feeds contain sufficient lysine and minerals before providing them to foals or weanlings. High-quality protein sources used in formulating 16 percent crude protein feeds will supply sufficient lysine, as well as threonine, the second limiting amino acid.[17]

Fats and oils can increase energy density of grain mixes. Most commercial horse feeds contain approximately 3 percent natural fat (shown on the feed tag), and some contain supplemental fat (for example, a feed tag indicating 8 percent fat means that approximately 5 percent fat has been added). Topdressing fat or oil onto a balanced diet dilutes total nutrient balance, so rations must be properly balanced if fat or oil will be added.

High-quality grass or legume hays can meet horses' roughage needs. However, horse owners should be alert for mold or insects in hay. Even slightly moldy hay should not be fed. Alfalfa hay can contain blister beetles, which produce cantharidin, a compound highly toxic to horses. Before purchasing alfalfa hay, horse owners should ask hay producers whether steps were taken to avoid blister beetles. Blister beetles can be found in other hays, but they are found more often in alfalfa than in other roughage sources.

Young foals nurse up to 70 times daily, indicating that they are well suited to small meals.

Where foals are allowed to eat with their mothers, that feed must be balanced to meet the foal's requirements, not the mare's.

Creep Feeding Foals

Although broodmares can produce large amounts of milk, its nutritional density declines over time. Thus, energy received from mare's milk may not meet the requirements of foals 4 months old (or even younger).[6] Soon after birth, nursing foals become interested in eating, often consuming small amounts of feed from the mare's trough. However, foals have very different nutritional requirements than do mares, so a "creep ration" should be provided. Foals may gain 2.5 to 3 pounds daily, and owners can use the right feed to take advantage of this early growth potential.

Creep feed should be introduced slowly and usually should be made available on a free-choice basis.[31] Free access to creep feed improves the likelihood that foals will consume it in frequent small meals, similar to nursing. Such feeding systems can be effective because young foals nurse up to 70 times per day. Mare-proof creep feeders can be constructed in pastures or corrals near areas where mares normally congregate, providing easy access to encourage foals to start eating a crop ration and to minimize injury. Feeders should be checked daily to monitor amounts eaten and to prevent feed from spoiling due to weather, birds, rodents or other factors. Careful management will be necessary, especially where several foals use the same feeders. Sometimes one foal may dominate, consuming large amounts of creep feed while preventing other foals from entering the feeder.

Concentrations of protein, minerals and vitamins needed in a good creep feed are influenced by the amount of energy (calories) young foals will eat. Feed tags usually do not indicate calories in a feed but do list percentage of crude fiber and fat. Both fiber and fat indicate caloric density and can be used to determine minimum amounts of protein, **lysine** and minerals that should be in a feed. **Table 2** shows the percentage needed in concentrates **that do not contain supplemental fat.** A grain mix with no supplemental fat usually contains 3 to 3.5 percent fat, the amount naturally occurring in most grains.

Feed tags will always show percentage of crude protein but may or may not include percentage of lysine or of minerals. **To meet foals' amino acid requirements with a reasonable amount of daily feed, a 14 percent crude protein feed that contains synthetic lysine should be fed.** (Horse owners should ask their feed retailer or call manufacturers directly to obtain this information if it is not included on the feed tag.) **Creep feeds containing not less than about 6 percent crude fiber and not more than about 3 percent fat** usually should contain at least 16 percent crude protein, **.70 percent lysine,** .80 percent calcium and .50 percent phosphorus, **yielding about 1400 kilocalories of digestible energy per pound.** Feeds with lesser amounts of these nutrients make it hard for young horses to consume enough protein (particularly lysine) and minerals in reasonable amounts of daily feed.

Supplemental fat increases total energy density of a grain mix. Therefore, at a given crude-fiber level, feeds containing supplemental fat need higher percentages of protein and minerals than do grain mixes or concentrates containing no supplemental fat. **Table 3** shows minimum amounts of protein and minerals needed in grains of varying crude fiber content, where 5 percent supplemental fat has been added (8 to 8.5 percent total fat shown on the tag).

Again, some top-quality broodmare feeds are well balanced for mares but lack protein quality and calcium: phosphorus ratios needed by foals. Relative to amount of energy provided, such feeds often provide no more than 90 percent of the lysine and 80 percent of the calcium needed by foals. Young horses allowed to eat such feeds may consume enough energy to gain weight but receive a nutrient supply inadequate for proper growth and skeletal development, often resulting in fat foals with improperly developed musculoskeletal systems. Without creep feeding a balanced foal ration, such situations may be avoided only by feeding broodmares a grain mix that meets the foal's nutrient requirements. In most cases, creep feeding foals in a separate feeder is more economical. **Table 4** shows an example creep ration for young foals.

Horse owners should avoid feeding programs that let foals eat from both the mare's trough and from a creep feeder by elevating mares' troughs so that foals cannot reach them.

Table 2. Concentrations of protein and minerals needed in creep feeds of varying crude fiber levels with no supplemental fat (3.0 to 3.5 percent crude fat shown on tag)

If tag indicates a crude fat content of 3.0 – 3.5 % and a crude fiber percent of	Then the following minimums are needed				
	Crude Protein* %	Lysine %	Threonine %	Calcium (%)	Phosphorus (%)
3 - 4	18	.75	.55	.85	.55
5 - 6	17	.72	.52	.78	.52
7 - 8	16	.70	.50	.70	.50

*A 14 percent crude-protein feed will meet the amino acid requirements of a foal only if that feed has been supplemented with synthetic lysine. Ask the feed manufacturer before feeding a 14 percent crude protein feed to foals or weanlings.

Table 3. Concentrations of protein and minerals needed in creep feeds of varying crude fiber levels with 5 percent supplemental fat (8.0 to 8.5 percent crude fat shown on tag)

If tag indicates a crude fat content of 8 - 8.5% and a crude fiber percent of	Then the following minimums are needed				
	Crude Protein* %	Lysine %	Threonine %	Calcium (%)	Phosphorus (%)
3 - 4	19	.80	.60	.90	.55
5 - 6	18	.75	.55	.85	.55
7 - 8	17	.72	.52	.78	.52
9 - 10	16	.70	.50	.70	.50

*A 14 percent crude protein feed will not contain sufficient lysine to provide the protein quality needed by foals, unless the feed manufacturer has added synthetic lysine. Consult feed company prior to feeding at 14 percent crude protein feed to foals or weanlings.

Foals with access to balanced feed still should be observed carefully to make sure they do not sort, thus consuming an unbalanced diet. Because foals tend to be picky eaters, pelleted creep feeds will deal with sorting problems better than will textured feeds. Such feeds will not harm horses if the feeds are of top quality and pellets are firm enough to force horses to chew them.

Feeding Weanlings

Many farms leave foals on mares longer than necessary;[12] although almost half of farms surveyed left foals on mares for 6 months or longer, such delayed weaning does not seem justified. Recent work showed no difference in bone density or wither height between foals weaned at 4-1/2 months and those weaned at 6 months.[51]

Research has shown that gradually weaned foals exhibit less stress than do abruptly weaned foals.[27] Whenever foals are weaned, the transition likely will be smoother and foals' growth will be improved if they have been creep fed.

The weaned foal that will weigh 1,100 pounds at maturity is expected to gain 1.5 to 2 pounds per day by 6 months of age. Total daily intake of hay and concentrate usually will range from 2 to 3.0 percent of a horse's body weight. Higher levels of intake are difficult to achieve and may overwhelm weanlings' digestive capabilities.

At weaning, many horses are placed in confinement to facilitate fitting programs. Young horses that are stalled and given forced exercise need to be fed a balance of correct nutrients to minimize joint disorders and to allow for increased skeletal remodeling in response to work. Because these young horses must lay down bone in support of both growth and exercise, inadequate nutrient supply can produce weak, fibrous bone rather than strong, dense bone.

Many horse owners favor giving weanlings an exclusive diet of oats and alfalfa hay. While both of these are excellent feedstuffs, a 70:30 ratio of oats to alfalfa hay provides only 90 percent of the lysine and 80 percent of the calcium needed by weanlings, relative to the caloric density **(see Table 5).** Also, the commonly fed 50:50 diet of oats and alfalfa provides even less of these required nutrients. Oats and alfalfa hay may be fed as part of weanlings' daily diet, but supplemental nutrients are needed as well, to help prevent swollen physes and joints and other skeletal problems. One study found that horses eating only oats and alfalfa got fatter, while those eating a balanced concentrate along with alfalfa gained more height.[14]

Some Texas farms have tried to manage weanlings by feeding concentrate:hay ratios more suited to yearlings.[12] Weanlings cannot process hay or roughage as well as yearlings; an oversupply of roughage relative to amount of balanced concentrate feed is partially responsible for the pot-bellied, scruffy appearance of some weanlings. A feeding program containing roughly a 70:30 ratio of concentrate to hay will help to achieve the gains and skeletal development of which weanling horses are capable.[31]

Young horses can be developed equally well using either grass or legume roughage, but the type and quality of hay or grazing available will influence the nutrient concentration needed in a grain or concentrate mix. Research has shown that high-quality alfalfa is more digestible than grass hay, but good-quality grass hay is more digestible than average-quality alfalfa.[13] The added "bloom" that some horse owners recognize when feeding alfalfa is due to the additional energy in alfalfa compared to many grass hays. This same appearance can be achieved with grass hay as a roughage source by balancing the grain mix based on the particular hay's nutrient content. **Because of uncertainty as to whether protein in very-good-quality alfalfa interferes with calcium retention, there is merit to feeding young horses a mixture of both grass and alfalfa hays.**

The ration shown in **Table 4** was designed to be fed with high-quality grass hay or with a mixture of grass and alfalfa in a 70:30 grain-to-hay ratio.

Weanlings with access to good-quality alfalfa hay generally need less protein and calcium in the concentrate mix. However, the grain mix should always contain at least as much calcium as phosphorus, with enough protein to meet amino acid requirements. Although alfalfa contains much more calcium and protein than do grass hays, some calcium may be unavailable, and much of the protein is not absorbed in the form of the amino acids needed for growth.[13,21]

Feeding Yearlings

As young horses become yearlings, necessary nutrient concentrations in proportion to energy levels in feedstuffs become lower but no less important. Yearlings not being fitted for sales, futurities or early training can be developed at a moderate rate of growth on all forage diets.[19,42]

Forage availability is as important as forage quality in determining growth rates.[1,52] **Yearling horses can meet the majority of their nutrient requirements for moderate growth from forage because they graze 15 or more hours per day on improved, high-quality pastures.**

Yearlings being fitted or conditioned and receiving forced exercise will require a combination of roughage and concentrate, regardless of whether moderate or rapid growth is desired. Yearlings receiving top-quality grass hay or grazing can be fed a balanced ration such as that shown in **Table 6**, at a 65:35 ratio of grain-to-hay. If lower-quality hay is being fed (less than 7.5 percent crude protein), a ration higher in protein and other nutrients is required. Yearlings fed top-quality alfalfa hay (minimum 15 percent crude protein) will require a grain or concentrate containing at least 12 percent crude protein. Since hay quality varies, serious horse owners should take core samples from their hay supply and have these cores analyzed for nutrient content.

Forced exercise associated with fitting programs increases yearlings' needs for calcium, phosphorus and magnesium. Recent research with long yearlings in training has demonstrated a 35% increase in requirements for calcium and phosphorus. It appears magnesium requirements are about two times higher than previously estimated.[30,46.] These mineral needs are best met by feeding formulated horse feed rather than by trying to supply individual minerals in addition to the feed.

When fed for rapid development, numerous evenly spaced feedings over 24 hours help promote growth.

Feeding Management for Best Results

The very best formulated rations may not yield desirable results simply because of how they are fed. Even the most carefully balanced grain mix will be only as effective as the feeding management program in which it is used.

Hay and grain intake varies according to the individual horse and is influenced by exercise levels. Body condition should be monitored routinely,[16] and feed allowance should be increased or decreased based on the horse's appearance. Remember that horses' requirements are calculated based on weight rather than on volume. Grain rations shown in **Tables 4 and 6** contain more energy than do plain oats, with from 10 to 15 percent less concentrate normally needed to achieve similar body condition. **Table 7** shows examples of **minimum** amounts of hay and concentrate to be fed to meet an average horse's requirements. Feed intake should be increased gradually, making sure that hay intake remains adequate. Note the differences in feed intake for moderate growth versus feed intake for rapid growth.

Routine after-weaning management usually creates an artificial environment of meal feedings. Foals are accustomed to nursing 70 times per day early in life, then typically end up in confinement or semi-confinement, in a meal-feeding situation. While young horses most commonly are fed twice daily, evidence suggests that feeding three or four times in 24 hours actually may improve nutrient absorption while decreasing surges in glucose and insulin.[11] For maximum success and minimal digestive problems, feedings should be evenly spaced, with equal time intervals between each feeding, including from the last feeding of the day to the first feeding of the next day.

Forced exercise should be conducted on footing that is not too deep.

Role of Exercise

Exercise is vital in fostering growth and in maintaining cartilage, bone quality and strength[29.] However, epiphysitis, osteochondrosis (OCD) and some expressions of "contracted tendons" may result from nutrient imbalances in young horses receiving excessive forced exercise in deep footing.

Obviously, horses being conditioned for shows or sales must be kept in confinement and worked, but the manner in which they are worked is very important. **In one study of young horses, exercise did not influence the number of OCD lesions, but the most severe lesions were observed in stall-rested horses.[29] Although exercise is important,**

Yearlings will grow at a moderate rate on improved pastures. Supplemental feeding will further improve body condition and gain.

forced exercise should include routine evaluation; in most cases, young horses also will benefit from free exercise. Intense, hard work should be introduced gradually to encourage proper bone remodeling. Sudden changes in stress cause the skeletal system to remodel bone, but it takes time to develop needed strength. If at all possible, conditioning programs should provide adequate free exercise. Some conditioning programs alternate intense work with free exercise and less-intense work on a weekly basis to provide time for bone remodeling to occur. **Well over half of Texas farms surveyed reported using forced exercise on an every-other-day basis[12]. Such schedules are supported by research showing the importance of providing adequate recovery time from skeletal strain.[30]**

It is important to remember that the skeletal system must be developed first, and the muscle system, later. The skeletal system is best stimulated by very short work periods on firm footing, followed by free exercise on soft footing.[4] Excessive forced or free exercise on firm footing may cause trauma to the juvenile skeleton.

Do Not Use Anabolic Steroids

There has been a great deal of interest in anabolic steroid use and its effect on the horse industry. Controlled research trials have shown that growth rates have not improved for horses injected with varying levels of anabolic steroids.[5] However, these studies observed altered sexual behavior in treated horses.[44,45]

Injected stallions had decreased scrotal width, and their testicular weight was 40 to 60 percent less than that of untreated horses. Sperm motility and concentration and total sperm per ejaculate all were lowered significantly by steroid treatment. Injected mares had small, hard ovaries typical of winter anestrous mares. These mares cycled less regularly and often exhibited abnormal behavior, such as mounting and teasing.

Anabolic steroids actually may cause premature closure of the physes of long bones,[24] resulting in cessation of growth. These studies all suggest that use of anabolic steroids for growth promotion is detrimental to young horses.

Blood and Hair Analysis

Blood and hair analyses sometimes are used as indicators of nutritional status. However, it should be pointed out that, regardless of calcium in the diet, blood calcium levels normally remain fairly constant at the expense of calcium mobilization from the bone.[26] Furthermore, hair analyses are of little or no value in measuring calcium and phosphorus status and may not be indicative of mineral deficiencies.[9,53] Only proper ration formulation and accurate feeding management reliably indicate nutritional status.

Summary

Raising young horses that are sound and competitive in today's horse industry requires a carefully planned feeding and management program. Some horses inherit a propensity for skeletal defects, and such problems may appear when these horses are fed for rapid early development. In many cases, however, skeletal disorders are the result of nutrient imbalances that precipitate abnormal bone metabolism. When such nutrient imbalances are paired with confinement and excessive, forced exercise in deep footing, skeletal problems may result. However, if horses are free from genetic defects, there is no reason to expect that rapid early growth itself will cause skeletal disease and lameness. Horse owners who give time and care to the feeding of properly balanced rations can expect to be more successful in growing young horses. Careful feeding for moderate or rapid growth rates can better ensure that such horses are sound at maturity.

Table 4. Creep feed and weanling ration (weanling ration designed to be fed with good-quality grass hay or grazing or a mixture of grass and alfalfa hay)

Ingredients	Percent	Pounds/ton	Calculated Analyses
Cracked Corn	40	800	Crude Protein=16.5%
Oats	32.5	650	Lysine=.80%
Soybean meal	20	400	Digestible energy=1.39 Mcal/lb.
Molasses	5	100	Far=3.2% (no added fat)
Calcium carbonate	1	20	Fiber=6%
Dicalcium phosphate	1	20	Calcium=.80%
Trace Mineral Salt	0.5	10	Phosphorus=.50%
Vitamin A	+	+	Vitamin A added at 1200 IUs/lb.

Table 5. Comparison of weanling requirements and nutrients provided per unit of energy for a weanling eating straight oats and alfalfa hay.

Nutrient:calorie ratios (grams of nutrient per megacalorie of digestible energy)

Nutrient	Provided by oats and alfalfa hay	Required by Weanling
Protein	51.0	50.0
Lysine	1.8*	2.1
Threonine	1.6	1.5
Calcium	1.7*	2.1
Phosphorus	1.2	1.2

*Lysine is less than required. Weanlings eating this diet are protein sufficient but deficient in the number one growth-limiting amino acid. Weanlings also are deficient in calcium, unless larger amounts of alfalfa hay are fed. However, extra alfalfa will not correct the lysine deficiency.

Table 6. Yearling ration (to be fed with good quality hay)

Ingredients	Percent	Pounds/ton	
Cracked corn	47.5	950	**Calculated Analysis**
Oats	30	600	
Soybean meal	15	300	C.P = 14.7%
Molasses	5	100	Lysine = .66%
Calcium carbonate	.5	10	Dig. Energy = 1.42 mcal/lb
Dicalcium phosphate	1.5	30	Calcium = .66%
TM salt	.5	10	Phosphorus = .63%
Vitamin A	+	+	Vit A added at 1500 IU's/lb

*Important: Read section on use of feedstuffs and potential problems.

Table 7. Examples of various daily feeding amounts for young horses being fed rations shown in Tables 5 and 7* (1,100-pound mature weight)

Age	Alfalfa hay (pounds)	Pounds 14% mix ** (Table 7)	Grass hay (pounds)	Pounds 16% mix (Table 5)	Total feed (pounds)
Weanlings					
Moderate growth	3.75	8.75			12.5
Rapid growth	4.00	10.00			14.0
Moderate growth			3.75	8.75	12.5
Rapid growth			4.00	10.00	14.0
Yearlings					
Moderate growth		10.00	7.00		17.0
Rapid growth		11.25	7.25		18.5

- Combinations of hay and grain shown represent MINIMUM amounts to meet requirements. Adjust intake gradually according to desired body condition and based on individual variability and exercise. Horses should be fed at least twice daily. Dividing total amounts shown into at least two equal feedings will minimize digestive disorders.
- **Do not feed a 14% crude protein feed to weanlings unless that feed contains at least .7% lysine. If lysine content is not shown on the tag or the bag, contact the feed manufacturer to determine lysine concentration.

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Protect Your Young Horses
Horse Theft Awareness and Prevention

- Consider permanent identification with brands, microchips or lip tattoos.
- Record permanent marks or brands with the county clerk in the county where the horses live.
- Keep on hand current photographs or video footage of weanlings, yearlings and two-year-olds. Be sure photos or video include any unique marks, brands, color patterns or other distinguishing characteristics.
- Establish an organized proof-of-ownership file with photos, registration information, health papers and any other supporting information.
- Secure barns, corrals or pens from the road with a good perimeter fence.
- Use well-built gates that cannot be lifted off the hinges and that can be locked.
- Feed pastured horses well away from the gate or road, because horses will congregate around feeding areas and be easier to catch.
- Check on pastured horses regularly. Keep up activity levels and consider establishing a horse/facilities watch program with others in your area.
- Do not leave halters on pastured horses, particularly young, growing horses.
- Do not leave halters hanging where they can be used by somebody else, and lock up expensive tack.
- Secure hitches on horse trailers or hide trailers from public view, making them harder to see and even harder to steal.
- Post warning signs on pasture gates and fences where appropriate.

Contact Texas Cooperative Extension for the following information on horse theft awareness and prevention:

L-5210 – *Fifteen steps to minimize theft of horses and equipment*
L-5211 – *Permanent identification of horses*
L-5244 – *What to do if your horse is stolen*
Video Tape – *Horse Theft Protection*

All printed and video material related to horse theft awareness is free to horse owners in Texas. Contact your local county Extension office, or the Extension Horse Specialists, Kleberg 249, TAMU 2471, College Station, Texas 77843. Printed material also is available at *http://aminalscience.tamu.edu*

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More Extension publications can be found at AgriLifeBookstore.org

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