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GROWTH MANAGEMENT OF YOUNG HORSES TO ACHIEVE DIFFERENT COMMERCIAL ENDPOINTS

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Unlike other livestock, horses are bred, kept and raised solely for the enjoyment of man. The number of breed associations in existence is testament to the fact that uses of the horse are varied. The purpose for which one breed of horse is raised may have no relationship to the primary purpose of another breed. There are differences between breeds in use or function and within breeds there is variation in type and use. Probably nowhere is this more true than in the “stock horse” breeds where horses may be used for halter, rail classes, racing, cattle classes and so on. The reality that we as nutritionists deal with is widely divergent nutritional management required to achieve different commercial endpoints. It is really of no significance to tell a man raising futurity horses that he is feeding a young horse too much feed. If he does not maximize growth and condition early on, he will not win a prize come futurity time. When making feeding and feed recommendations one must be acutely aware of the goal the horseman is trying to achieve with his or her horses.

The horses

As I perceive the industry of raising young horses, the horses fit into a few pretty widely divergent categories based on how they will be used and marketed. Each of these classes of horses have unique nutrient requirements needed to support the level of growth and differences in body composition which will allow them to be successful. These horses can't be divided solely by age at which they are going to be marketed as there are differences in what is expected even for horses of the same age. The types of horses that we deal with in designing nutrition programs are as follows:

- Futurity weanlings
- Weanlings to be sold as weanlings
- Weanlings to be kept
- Halter yearlings
- Summer sale yearlings
- Fall sale yearlings
- Yearlings to be retained

It is prudent for us to discuss the physiology of growth that must be considered in dealing with young horses which are to be “used” prior to maturity. In all of the classes of horses above except for yearlings to be retained, the common denominator is that the growth curve must be moved to the left. Speeding physiological maturity is not simply a matter of adding weight but if done correctly, means increasing skeletal growth, muscle protein accretion and fat deposition. Many people think the futurity weanling or halter yearling is simply a fat weanling or yearling. If the feeding management, fitting and exercise programs are done correctly these “fat” young horses not only carry more condition but are also taller for their age and have greater muscle mass as well. The goal, then, is to encourage greater physiological maturity at an earlier chronological age. To get this done and not sacrifice quality of growth and skeletal integrity is the real challenge.

Nutrient requirements for growth “and fattening”

The basis for proper growth requires that the requirements for all nutrients be met in a manner that allows growth to proceed in a balanced and synchronized manner.

Nutrient requirements for growth listed in the NRC publication, “Nutrient Requirements of Horses” or those requirements that Kentucky Equine Research (KER) has derived from the research concerning growing horses should be considered a commercial starting point. The requirements listed by the NRC are described as being minimum values for normal growth and those of KER are optimum rather than minimum values.

For a producer in the business of raising two-year-olds to race or to show the KER requirements are quite adequate. When a producer needs to alter normal growth, precision and care need to be practiced in meeting nutrient requirements.

When a commercial feed is formulated, the concentration of nutrients in the feed is based on an estimate of the dry matter intake for the specific class of horse to which the feed is to be fed. Additionally some kind of thought should have gone into the type of forage that might be fed and the average nutritive value of the forage. This approach is usually close to correct if the assumptions are correct. The horse is generally pretty forgiving and tolerates a wide range of nutrient intakes without too many problems. When programs like the ones shown in tables 1 and 2 are used, there is the potential for problems. On one end of the spectrum, large amounts of unfortified cereal grains are fed. These programs many times result in the horse being fed far more phosphorus than calcium and in frank deficiencies of many of the trace minerals. The other extreme, while intended to be nutritionally more correct, results in excessive intakes of many nutrients. If a legume or heavy mixed hay is fed this is particularly true for calcium and protein. Although there are no definitive data which show that calcium intakes like those seen in table 2 are detrimental, there is no justification for exceeding the requirement for any nutrient to the extent seen here. This is one of the major problems with feeding a grain mix to horses based simply on the concentrations

Table 1. TYPICAL HAY AND OATS FEEDING PROGRAM FOR WEANLINGS.
(6 MONTH OLD WEANLINGS WEIGHT OF 550 LBS. DRY MATTER BASIS)

<i>Daily Nutrient Intake</i>	<i>Mixed Hay</i>	<i>Oats-grain</i>	<i>Requirements (KER)</i>	<i>Total Nutrients</i>	<i>% of Required Supplied</i>
Intake (lb/day)	7.02	9.00		16.02	
DM (lb/day)	6.18	8.03	16.5	14.21	
Protein (lb/day)	1.09	1.06	1.92	2.15	112
Lysine (oz/day)	0.39	0.56	1.29	0.96	74
DE (Mcal/day)	5.74	11.66	17.40	17.40	100
Ca (g/day)	27.12	3.27	44.25	30.40	69
P (g/day)	8.93	13.91	29.50	22.84	77
Mg (g/day)	7.98	5.73	14.75	13.70	93
Na (g/day)	3.19	2.05	22.50	5.24	23
Cl (g/day)	12.76	3.68	33.75	16.45	49
K (g/day)	76.26	16.36	52.50	92.63	176
Cu (mg/day)	31.91	24.55	150.00	56.45	38
Se (mg/day)	0.29	0.86	1.88	1.15	61
Zn (mg/day)	63.82	143.18	450.00	207.00	46
Iodine (mg/day)	0.26	0.45	1.50	0.71	47
Mn (mg/day)	143.59	147.27	500.00	290.86	58

Table 2. WEANLING FEEDING PROGRAM FEATURING A 16% PROTEIN COMMERCIAL CONCENTRATE AND ALFALFA HAY.

<i>Daily Nutrient Intake</i>	<i>16% pellet</i>	<i>Alfalfa hay</i>	<i>Requirements (KER)</i>	<i>Total Nutrients</i>	<i>% of Required Supplied</i>
Intake (lb/day)	9.00	8.00		17.01	
DM (lb/day)	8.10	7.24	15.00	15.33	
Protein (lb/day)	1.44	1.44	1.61	2.89	180
Lysine (oz/day)	0.94	1.04	1.08	1.98	183
DE (Mcal/day)	12.27	8.15	14.58	20.42	140
Ca (g/day)	36.82	46.55	36.14	83.36	231
P (g/day)	28.64	6.91	24.09	35.55	148
Mg (g/day)	12.27	11.27	12.05	23.55	195
Na (g/day)	17.18	5.09	20.45	22.27	109
Cl (g/day)	22.09	13.82	30.68	35.91	117
K (g/day)	28.64	84.36	47.73	113.00	237
Cu (mg/day)	163.64	41.45	150.00	205.09	137
Se (mg/day)	1.76	1.82	1.70	3.58	210
Zn (mg/day)	450.00	98.18	450.00	548.18	122
Iodine (mg/day)	1.23	0.55	1.36	1.77	130
Mn (mg/day)	409.09	120.00	500.00	529.09	106

that by convention have been recognized as appropriate. In reality, the appropriate feed for any class of horse should be based on intake, type of forage fed and the nutrient concentrations in all of the dietary constituents. While a “16 percent” may be appropriate for a young horse on grass hay, a “12 percent” may be the most appropriate feed for a young horse on a high intake of legume hays. This is why a thorough evaluation of the entire program is necessary if the nutrient requirements of the horse are to be accurately met.

Many times when feeding programs are put together, little or no emphasis is put on the forage feeding program. Nutrient requirements are met using a concentrate feed and nutrients derived from the forage are considered bonus nutrients. When confinement systems are used and when horses are raised in “pipe corrals” this is not as much of a concern as when good pasture is available. Weanlings that are raised on good quality pasture should be fed in a manner very different from that used when horses are on poor quality pasture or when pasture does not really fit into the nutrition equation.

Futurity weanlings

By definition weanlings that are going to be prepared for futurities are kept in the barn from the time they are weaned until the time they are shown. This makes meeting their nutrient requirements easier in some respects than is the case for sale weanlings or weanlings that are going to be kept for later marketing goals. One important consideration is weaning time. Weaning time is affected by the month of birth of the foal, the milk production of the mare and the date of the futurity. January, February and March foals can be weaned later than can April and May foals. It is possible to wean January and February foals at 5 months and still get them ready for the futurities, March foals generally should be weaned at 4 months and later foals need to be weaned at 3 months or alternatively, just prior to the futurity. If weaning time is too close to the futurity, it is likely that the weanling will appear pot-bellied due to a nearly unavoidable post-weaning slump.

Once weaned, the foal should be fed a very palatable feed. The feed should be offered in three or more small feeds rather than in two large ones. It is common for some producers to offer feed free-choice to horses destined for futurities and seven lbs of feed per day is a working minimum needed to get adequate condition by show date. Table 3 shows the nutrient intake that weanlings may see in the time leading up to the futurity. In addition to lots of feed, most show weanlings are being confined to stalls much of the day and are put on some kind of a forced exercise program. Getting nutrient intake right is important for these horses. I would generally recommend a legume hay for futurity weanlings or at least a very high quality grass hay that is cut in early stages of maturity. I use some added fat in the diet and have used as much as 4 ounces of vegetable oil per feeding. Exercise is critical for these horses to achieve

some definition of muscle and to prevent them from becoming heavy middled. If a producer insists on feeding their weanlings free-choice, I use a higher fiber oat-based feed, appropriately fortified for the type of forage being fed. Using a higher fiber feed increases safety and using oats as the starch results in less soluble carbohydrate reaching the cecum. The following feeding program might be typical of the program I would use in fitting weanlings for a fall futurity.

Concentrate - 9 lbs
 Hay - 8 lbs
 Vegetable oil - 6 oz

Concentrate intakes need to be adjusted depending on the age and condition of the horse. Obviously, the foal in the period immediately post-weaning will not eat as much feed as the weanling just prior to futurity time.

Table 3. TYPICAL RATION USED TO PREPARE FUTURITY WEANLINGS FOR SHOW. (DRY MATTER BASIS, 6 MONTH OLD WEANLINGS WEIGHING 500 LBS.)

<i>Daily Nutrient Intake</i>	<i>13% Protein concentrate</i>	<i>Mixed hay</i>	<i>Requirements (KER)</i>	<i>Total Nutrients</i>	<i>% of Required Supplied</i>
Intake (lb/day)	9.00	9.00		18.00	
DM (lb/day)	7.83	7.92	15.00	15.75	
Protein (lb/day)	1.2	1.4	1.61	2.60	162
Lysine (oz/day)	0.76	0.51	1.08	1.27	118
DE (Mcal/day)	11.45	7.36	14.58	18.82	129
Ca (g/day)	27.00	34.77	36.14	61.77	171
P (g/day)	27.95	11.45	24.09	36.41	151
Mg (g/day)	9.41	10.23	12.05	19.64	163
Na (g/day)	7.36	4.09	20.45	11.45	56
Cl (g/day)	9.00	16.36	30.68	25.36	83
K (g/day)	28.64	97.77	47.73	126.41	265
Cu (mg/day)	151.36	40.91	150.00	192.27	128
Se (mg/day)	1.64	0.37	1.7	2.00	118
Zn (mg/day)	388.64	81.82	450.00	470.45	105
Iodine (mg/day)	1.47	0.33	1.36	1.80	132
Mn (mg/day)	261.82	184.09	500.00	445.91	89

All of this nutritional management is of little benefit if the other components of the fitting program are not optimized. Horses should be exercised daily, groomed intensively and be on a good deworming program. Doing the little thing well is the difference in having a fit horse and simply having a weanling that is fat.

Sales weanlings

Designing a feeding program for the sales weanling entails attention to the individual. In the Thoroughbred business, most of the weanling sales are in the fall of the year. In order for the weanlings to bring the greatest return to the producer they need to carry a bit more condition than weanlings which are going to be retained for sale as yearlings. Hair quality is important. Some producers are body clipping their weanlings about three weeks prior to the sale while others use blankets to make the hair lay. Another alternative is to put the weanlings under artificial lights. Increasing or maintaining light at 15 hours per day retards hair growth and this technique is fairly effective. I hate to buy a weanling that has been “under lights” since it seems that getting the hair right on a yearling that has been under lights as a weanling is more difficult than for non-lighted weanlings.

Feeding the sales weanling is a little different from the futurity weanling in that pasture generally plays a greater role in nutrient intake and as such not as much concentrate feed is required. Assuming that good quality forage is available, it is rare that I would have a sales weanling eating as much as eight lbs of feed per day. This of course will vary with the foaling date of the weanling, pasture availability and the shape or conformation of the weanling. Heavier muscled, rounder, earlier maturing weanlings require less feed than do weanlings that are more angular and taller.

I generally use some vegetable oil for sales weanlings to get some bloom and to add some non-carbohydrate energy. If a sales weanling is showing a little too much middle I might use some beet-pulp shreds at 10% of the concentrate intake or some really high quality alfalfa hay.

For any weanling one should remember that in order for fattening to occur, the nutrient requirements for skeletal growth and muscle protein accretion must be exceeded or some nutrient in the diet must limit true growth so that excess calories may be used for fattening. If, for instance, total protein in the diet is limiting, calories over and above those used for muscle protein accretion will be converted to body fat rather than being used to promote protein synthesis. When one is trying to fatten a horse the nutrient:calorie ratio should be increased (i.e. more calories/gram of growth substrate). This is one reason why increasing the caloric density of the diet results in greater fattening.

Weanlings to be retained

Weanlings that are not going to sales or shows should be fed in a more conservative manner than the weanlings previously discussed. Generally the best way to assess the impact of the feeding program of these weanlings is through assessment of body condition. Weanlings should maintain a thrifty appearance. One should not be able to easily see the ribs but should be able to easily palpate the ribs. Monitoring weight

along with a good condition scoring system should allow for the accurate assessment of quality and quantity of growth. It is easy for us to say that a weanling should be fed a specific grain mix but care should be taken that the grain mix complements the type of forage being fed. When good quality pasture is available I recommend that feed intake be limited to around one pound of feed per month of age up to a maximum of 7 lbs of feed per day. Once this maximum is achieved the condition of the individual should be monitored and adjustments made in feed intake that are appropriate for the weanling in question.

Yearlings

If yearlings are to be shown or sold, basic requirements must be exceeded to the extent that increased fattening is desired. Normal growth rates of yearlings in central Kentucky show a characteristic increase in the spring of the year that corresponds to an increase in pasture availability. It is this increase that causes the yearlings to begin to get fat in late March and early April. The quality of the pasture is such that caloric requirements for growth are exceeded and calories are converted to fat rather than being used for growth. Concomitantly, growth rate has begun to decline in the 12 -15 month old horse and fewer nutrients are needed to support skeletal growth and muscle protein synthesis. All of these things in concert allow the yearling to begin “putting on condition.”

Unlike weanlings, skeletal maturity of the yearlings allows them to be fed at an accelerated rate without having such a negative impact on bone growth. It is interesting to see how few yearlings are lost to osteochondritis dissecans (OCD), wobblers syndrome, flexural deformity and other metabolic bone problems after March of their yearling year. It is fairly safe to push a yearling on after this time.

Before discussion of the feeding program for yearlings it is prudent for us to realize that the feeding program is but one of the variables in making the yearling sales or halter horse get fit! So much of the ultimate appearance of the horse at the show or sale depends on the exercise program, how much grooming the horse gets and on genetics. Sometimes the success or failure of a yearling program is based more on these factors than on the feeding management program per se. I have seen numerous instances when the feeding programs were identical for two farms but where the final product at the sales or at the show was entirely different. Fitting yearlings is a paper in and of itself but suffice it to say that lots of dollars have been left on the table by people that fed them right but fit them wrong.

Halter yearlings

Halter yearlings are produced by a continuation of the feeding program begun for the weanlings. Fat or condition is cumulative and in order to achieve the halter fit look, it

takes some time. It generally takes 90 - 120 days from the pasture to the show ring depending on the condition of the yearling when it arrives to start the fitting process.

There are as many feeding programs to fit the yearling for show as there are trainers and fitters. I know people that do a good job fitting yearlings on alfalfa pellets or alfalfa cubes and a supplement, while others use straights (cereal grains) and a supplement pellet or complete pelleted or textured feeds. The critical aspect of the program is meeting nutrient needs, not so much how they are met. Also critical is to recognize differences between individuals and to design programs that cater to those individual needs.

Similar to weanlings, yearlings being fit for show are rarely turned out to pasture. Most of the halter yearlings in the world spend about 22 hours a day in the stall. Their time out of the stall consists of 30 minutes in the round pen, an hour tied to the wall with a neck sweat on and thirty minutes in the wash rack getting rubbed on. Hay intake of halter yearlings is limited to not more than 1.5 percent of body weight per day and concentrate intakes range from 10 - 15 lbs of feed per day. Lower end concentrate intakes are seen when good quality alfalfa hay is being fed while the upper end of the range is characteristic of programs that utilize coastal hay or other grass hays. The important thing to realize when feeding yearlings for halter is to minimize meal size as much as possible. There are a great many really good yearlings that colic or founder due to grain overload. Much of this is preventable if smaller meals are fed more frequently. In fitting yearlings it is imperative that individuals be fed according to their own set of requirements. If a yearling is too thin he needs more groceries and if he is too fat, feed should be cut back! If these horses get shaky on their knees, caloric intake should be decreased until they are stable and then feed should be gradually increased. Nutritional tools that are useful in fitting the yearling for show include vegetable oil or other fat sources and beet pulp. When it is difficult to "finish" a yearling, the addition of these two components to the diet will get the bloom that is necessary.

Sales yearlings

Sales yearlings are really the same as show horses but not as extreme. Buyers now are looking for the athletic yearling rather than simply the fat yearling. Even so, ribby, ill prepared yearlings are not going to bring top dollar in the sales ring. Most of the yearling sales are held in the summer or early fall. The horses are from 14 - 18 months of age. Obviously younger horses, April, May and June foals have to be pushed harder than is the case for earlier foals in order for them to carry the same condition as their older contemporaries.

I would start the prep program in earnest about 90 days before the anticipated marketing target. This generally includes alteration of the turn-out program so that yearlings are in during the day and out at night. This turn-out schedule keeps the yearling from getting sunburned and also makes individualizing the program easier. For sales yearlings it is an absolute travesty to present a group of yearlings for sale

that have had their tails chewed off. I recommend that yearlings have something kept in their tails from weaning time onward. Any number of formulas work for this purpose. The more popular ones include axle grease and cayenne pepper, fish oil and pepper, Cribox, No Chew, etc. Don't wait until you have horses coming in with their tails chewed off to start using something. Use something in the tails as a matter of habit!

Table 4. EXAMPLE "PREP RATION" WHICH MIGHT BE FED TO YEARLINGS LEADING UP TO THE KEENELAND SEPTEMBER YEARLING SALE.

<i>Daily Nutrient Intake</i>	<i>Protein Concentrate</i>	<i>Mixed Hay</i>	<i>Mixed Pasture</i>	<i>Vegetable Oil</i>	<i>Requirements (KER)</i>	<i>Total Nutrients</i>	<i>% of Required Supplied</i>
Intake (lb/day)	10.00	10.00	3.81	0.5		24.31	
DM (lb/day)	8.70	8.80	3.81	0.5	20.00	21.80	
Protein (lb/day)	1.33	1.55	0.71		2.42	3.59	149
Lysine (oz/day)	0.85	0.56	0.27		1.63	1.69	103
DE (Mcal/day)	12.73	8.18	3.46	2.04	24.37	26.41	108
Ca (g/day)	30.00	38.64	9.52		48.31	78.16	162
P (g/day)	27.73	12.73	5.20		32.21	45.65	142
Mg (g/day)	10.45	11.36	4.16		16.10	25.97	161
Na (g/day)	8.18	4.55	0.69		27.27	13.42	49
Cl (g/day)	10.00	18.18	2.60		40.91	30.78	75
K (g/day)	31.82	108.64	31.69		63.64	172.15	271
Cu (mg/day)	168.18	45.45	19.05		163.64	232.69	142
Se (mg/day)	1.82	0.41	0.16		2.27	2.38	105
Zn (mg/day)	431.82	90.91	69.27		545.45	592.00	109
Iodine (mg/day)	1.64	0.36	0.14		1.82	2.14	118
Mn (mg/day)	290.91	204.55	173.18		545.45	668.64	123

Designing a sales yearling feeding program that works is a matter of looking at the requirements of the individual within the group and feeding the yearling as an individual. How much one needs to feed depends on the amount and quality of forage available. Even in central Kentucky, concentrate intakes necessary to achieve optimum condition vary widely between farms. On those farms with really good pasture it takes less feed than on farms that are overstocked. On farms where a significant amount of good quality legume hay is fed it generally takes less feed than when only grass hay is fed. There are some thumb rule minimums for grain intake that serve as a good starting point. It is rare that I would have a yearling on less than seven pounds of feed per day in addition to liberal intakes of good forage and rare also to see a yearling eating more than 14 pounds of feed in the days leading up to the sales. In addition to the basal concentrate, I use added fat. Oil intakes may range from 2 - 6 oz. per feeding on a two times a day feeding routine. When yearlings are fed three times per day, 4 oz. of vegetable oil per feeding is generally my upper end. A representative example prep ration is shown in table 4. This ration covers most of the nutritional

bases when fed with free-choice salt. Preparing sales yearlings is a function of controlling energy balance and body composition. Getting horses to peak at the sales requires that the feeding program be closely monitored and started early. Allowances should be made for foaling date and sex of the yearling as fillies get fatter faster than do colts. If the sale is a long distance from where the yearlings are prepped a little insurance condition needs to be added to account for shrink in transit. If a yearling has a little too much middle coming up to the sale I generally do not worry as the stress of the sale will cause the yearling to “tuck-up” some and not look bad.

When a yearling is getting potbellied I do not reduce grain intake. I either increase hay quality, bed on shavings, limit pasture turnout, increase exercise or do all of these things depending on the severity of the problem. On more than a few occasions we have decreased feed intake to near zero on a set of horses in order to make them lose weight only to weigh them 30 days later and find they have gained as much as anything in the barn. If good quality pasture is available horses will increase intake and gain the same as some horses that are getting a lot of grain. The only way I know of to get some of these horses to tighten is to limit turnout and increase exercise.

Remember that you must know your marketing target and understand how horses are expected to look at that time in order to be successful. Time spent at the sales looking at horses is an investment in your business. If you do not understand the customer’s goals then you can’t make valid recommendations.