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A.N. Huff*

THE PROCEEDINGS  
OF THE  
HORSEMEN'S SHORT COURSE

March 9-11, 1978

Donaldson Brown Center for Continuing Education  
VPI&SU  
Blacksburg, Virginia

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THE VPI&SU EXTENSION DIVISION

In Cooperation with the

Virginia Tech Animal Science Department,  
The Virginia Horse Council,  
and The Horse Industry

Prepared By

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## Equine Nutrition Research Review

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Interest in horses has been increasing during the past several years. In 1918 there were 27 million horses and mules in the U.S., mostly heavy working animals. The numbers fell as mechanization in agriculture increased. The horse population was down to 3 million in 1960. A large increase has occurred since then, and in 1972 the number was up to 7 million.

Only very limited research is being conducted on the nutrition of horses, compared to other domesticated animals. Speed and endurance records on the tracks have not changed much during the past 80 years, whereas remarkable increases in efficiencies have occurred in other animals such as poultry, swine and dairy cattle. Perhaps, the difference in the amounts of research conducted accounts for the discrepancy.

Much of the information on which feeding recommendations are made was obtained with draft horses and cattle. Some of the master horsemen do a good job of feeding horses, based mainly on skills and expertise handed down from one generation to another. Modest research accomplishments are being made by a small group of devoted scientists. The results of that research will be summarized.

### Digestion of Feed

In the native state horses consumed large amounts of fibrous feeds. They are able to digest fiber by virtue of microbes in the cecum and colon. The action is similar to that which takes place in the rumen of cattle. Horses are apparently not as effective as cattle in digesting high fiber feeds (table 1), but they do a good job with low fiber feeds. The cecum and colon make up a smaller volume than the stomach compartments of cattle, expressed as percent of the digestive tract or of bodyweight. Also, digestion of fiber in cattle takes place toward the front of the digestive tract, allowing for more absorption, further digestion and digesting of the microbes, compared to the cecum and colon of the horse which are toward the rear.

TABLE 1. AVERAGE DIGESTIBILITY VALUES OF  
DIETARY COMPONENTS IN HORSES AND  
CATTLE

Item		Organic matter %	Crude protein %	Crude fiber %
High fiber Feeds	Horses (63)	51	56	38
	Cattle (24)	60	56	52
Low fiber Feeds	Horses (35)	79	79	56
	Cattle (10)	79	75	24

Robinson and Slade (1974)

Cornell workers have shown that the fibrous portion of a number of roughages was more highly digested in vitro by rumen bacteria than cecal bacteria. Indication was obtained that cecal microbes adapted to hay, digested forages better than those adapted to hay plus grain. In ruminants adding grain usually depresses fiber digestion. The horse is frequently compared to the rabbit concerning its ability to utilize fiber. However, as shown in table 2, it appears that the horse is superior to the rabbit in fiber and energy digestion. It is not clear how important the cecum is for digestion in the horse. Ohio workers reported lower neutral detergent fiber digestion by ponies with removed ceca, compared to those with intact ceca. Texas workers reported higher dry matter digestion in the entire digestive tract than in the tract prior to the cecum in Quarter Horses.

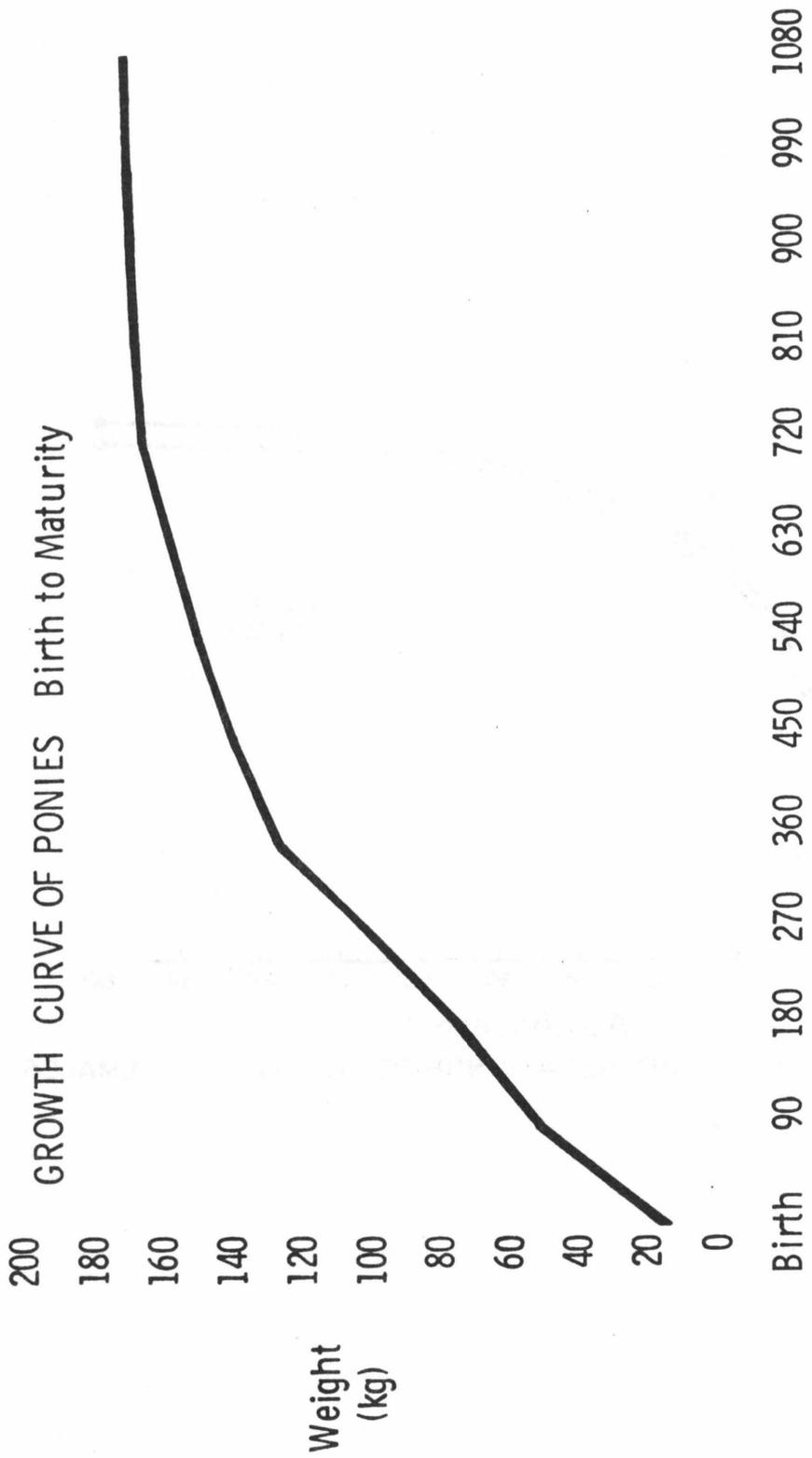
TABLE 2. MEAN APPARENT DIGESTIBILITY COEFFICIENTS  
FOR RABBITS AND HORSES

Item	Rabbits %	Horses %
Dry matter	47.4	70.0
Crude protein	80.2	53.0
Acid detergent fiber	25.0	47.5
Cell wall constituents	36.7	68.9
Ether extract	93.9	99.2
Ash	36.4	31.0
Digestible energy	49.3	79.9

Schurg et al. (1977).

#### Growth

Growth patterns were recently reported for ponies by a Minnesota worker, for thoroughbreds by Cornell workers and for Arabians by Cal Poly (Pomona) workers. The pony study included 198 head ranging from foals to lactating mares. The growth curve of ponies from birth to 1 year of age was about a straight line, tended to slow down thereafter, and mature weight was reached at about 3 years of age (figure 1). The Thoroughbred records were from 1992 foals under 18 months of age. Colts were heavier than fillies at birth and the difference increased during the measurement period (18 months). Mares less than 8 years of age and older than 12 years had lighter foals at 18 months. Foals born in April, May or June were heavier at birth and at 4 to 18 months than those born in January, February or March. Growth and development of 75 Arabians from the W. K. Kellogg Arabian Horse Center at California State Polytechnic University, Pomona, were studied from birth to 60 months of age. The fastest maturing measurement was in length of body for males and length of body and height at hip for females (36 months). Average mature size at maturity was greater for males than females for all measurements except length of body. Age-weight relationships for males and females are shown in figure 2.



Days of Age

Figure 1.

Jordan (1977)

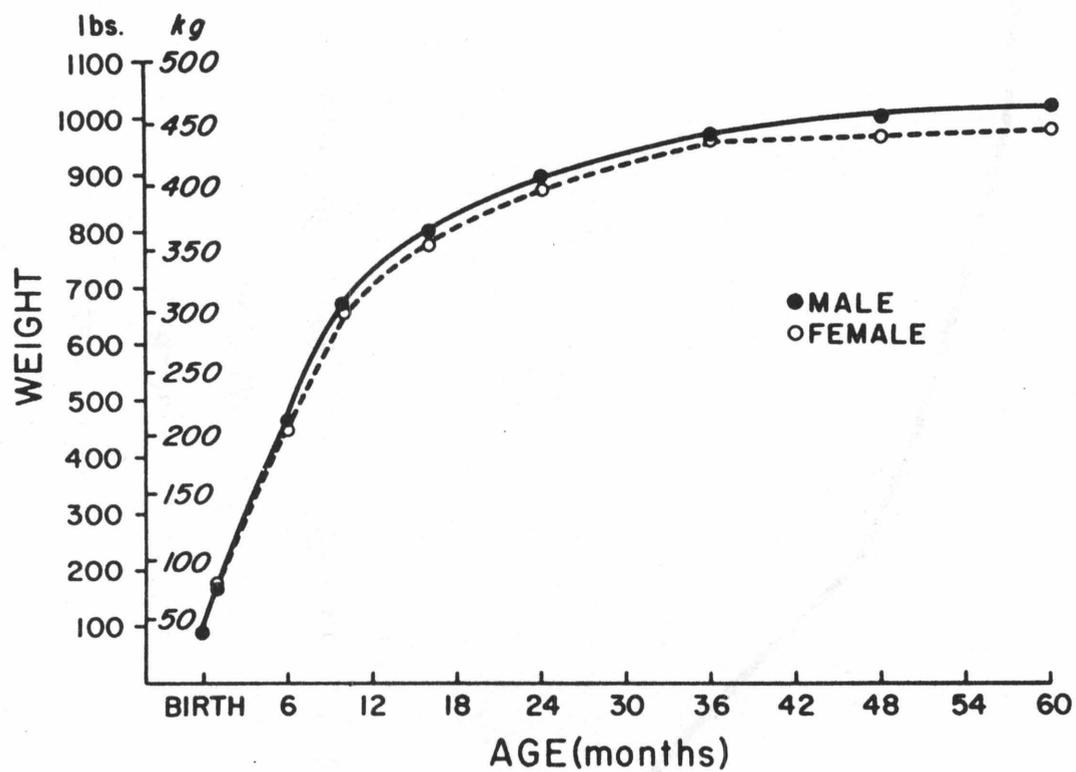


Figure 2. AGE-WEIGHT RELATIONSHIPS FOR MALES & FEMALES

Reed and Dunn. (1977)

## Energy

Since the primary purpose of horses in the U.S. is for pleasure, involving work by the horse, considerable emphasis has been placed on energy nutrition of the horse. Energy expenditure increases with exercise, especially strenuous exercise.

Researchers at Theracon, Inc., Topeka, Kansas reported that the digestible energy requirement for maintenance of geldings was 33.8 kcal per kilogram of bodyweight (15.3 kcal/lb.). Illinois workers reported that Quarter Horse mares required 1188 kcal digestible energy per kilogram of milk produced. Texas researchers found that yearling horses of Quarter Horse breeding weighing 680 lb. and gaining 1.5 lb. per day required 20.73 Mcal of digestible energy per day. This value is about 23% higher than that reported by NRC for a similar horse gaining 1.2 lb. per day.

Colorado workers reported evidence that horses fed fat supplemented rations were able to endure stress of endurance type work better than those fed rations supplemented with protein or carbohydrates. Recently, researchers at Virginia and Kentucky obtained evidence of good digestion of corn oil by equine. More research is needed concerning utilization of fat by high performance horses.

## Protein

The protein requirement of horses is quite high during early growth, then decreases up to maturity. However, the requirement is increased dramatically in the mare at peak lactation. Texas researchers reported that 504 g of digestible protein were required by yearling Quarter Horses weighing about 680 lb. and gaining 1.7 lb. per day. This compares to the NRC value 472 g for a comparable horse gaining 1.2 lb. per day. Florida workers concluded that 14.8% crude protein was adequate in a grain ration containing 1.36 Mcal digestible energy per pound for optimum growth and development of foals 8 months or older.

Since considerable microbial activity takes place in the cecum and colon it has been suggested that the horse can utilize non-protein nitrogen. California workers found that feeding urea increased nitrogen retention in mature horses. They suggested that the improvement was due to microbial synthesis of protein or free amino acids and subsequent absorption. Ohio researchers obtained evidence that urea was utilized by ponies. Cornell workers reported similar retention of absorbed nitrogen in ponies fed urea, soybean meal or linseed meal. They concluded that equines can utilize urea to increase nitrogen retention when fed low protein diets, but generally, efficiency of utilization of absorbed nitrogen from urea is less than that from preformed protein.

Research by Kentucky scientists indicate that protein synthesis in the cecum is of doubtful value to the horse. They found no evidence that radioactive carbon from microbes administered in the cecum was present in amino acids going to the liver. Later they found that lysine administered in the cecum was not absorbed. They concluded that no appreciable amino acid absorption occurs from the cecum or colon of equine. These results indicate that protein quality (amounts and proportions of essential amino acids) is important in the horse. Some evidence

of a beneficial effect of supplementing lysine to rations containing cottonseed meal was reported by Texas workers. Florida researchers reported that .5% lysine was sufficient for growth of 8-month-old foals. Gelatin has been recommended for treatment of defective hoofs, but Cornell workers recently reported that gelatin supplementation did not affect elasticity or strength of the hoof.

Digestible protein is frequently used in balancing rations for horses. However, tags on commercial feeds give guarantees in terms of crude protein. California researchers have developed a regression equation to calculate digestible protein from crude protein:

D.P. (%) = .800 X % C.P. - 3.30, where D.P. refers to digestible protein and C.P. refers to crude protein.

### Minerals

Bone problems are more common in horses than in other animals, so, much emphasis has been placed on mineral nutrition, especially calcium and phosphorus. Cornell researchers estimated that the optimum calcium to phosphorus for horses was 1.4:1 to 2:1. It is especially important that the phosphorus does not exceed the calcium level. Kentucky researchers found that high calcium (Ca:P ratios of 4.1:1 and 7.25:1) can be harmful to phosphorus digestion. Cornell workers reported that true absorption of calcium and phosphorus was similar from dicalcium phosphate, steamed bonemeal and a combination of ground limestone and monosodium phosphate. Louisiana workers have reported that hair composition is not a good indication of calcium and phosphorus status of ponies.

The potassium requirement of ponies was reported by Cornell workers to be 70 mg/kg bodyweight per day. This would be about 0.007% of the ration, which would be met under usual feeding or grazing situations. Minnesota researchers reported that ponies were quite resistant to copper toxicity.

### Vitamins

Horses have a physiological requirement for the vitamins required by large animals, but do not necessarily have a dietary requirement for all of these because of synthesis mostly by microbes in the digestive tract. Horses have a dietary requirement for vitamin A or its precursor, carotene. Usually, horses obtain sufficient vitamin D from exposure to sunlight or sun cured hay.

Microbes in the digestive tract synthesize B-complex vitamins, but there have been reports of specific deficiencies. However, the amounts usually supplied in the feed plus the amounts synthesized in the digestive tract provide sufficient amounts for most horses. It appears that sufficient amounts of vitamin K are synthesized by the microbes in the digestive tract.

Horses have a dietary requirement for vitamin E, but the amounts have not been determined. Rations containing good quality feedstuffs probably supply sufficient amounts. There is no clear evidence that supplementation of vitamin E helps prevent reproductive problems in horses. It has been shown by researchers from Theracon, Inc., Topeka, Kansas that ascorbic acid (vitamin C) is not a dietary requirement of mature horses.

### Early Weaning

Within the last few years there has been increased interest in early weaning of foals. Researchers from Ohio, Maryland and Ralston Purina Co. have obtained similar performance of early weaned foals as those left on the mare and weaned at conventional times. In order to obtain satisfactory performance in the early weaned foals, they will have to be fed properly, however. The mare produces substantial amounts of milk which is rich in nutrients. Milk production and the amounts of energy, protein, calcium and phosphorus supplied by the milk from lighthorse mares (1100 lb.) at different times during lactation are shown in table 3. The nutrients supplied by the milk will have to be provided by palatable and nutritious feed if the foal is weaned early.

TABLE 3. DAILY MILK AND NUTRIENT PRODUCTION BY THE BROODMARE<sup>a</sup>

Mo. of lactation	Milk prod. lb.	Dig. E. Kcal	Dig. pro. g	Calcium g	Phos. g
0 - 1	30.6	7928	412	16.7	12.1
1 - 2	32.3	8089	464	14.7	9.0
2 - 3	37.2	8353	764	13.5	8.1
3 - 4	33.2	7168	716	10.0	6.9
4 - 5	24.0	5078	517	7.1	5.0
5 - 6	16.5	3491	356	4.9	3.5

<sup>a</sup>Light horse (1100 lbs.).  
Ott (1977).

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## THE VPI&SU COOPERATIVE EXTENSION HORSE PROGRAM

BY Dr. A. N. Huff

ORGANIZATION FOR PROGRAM DEVELOPMENT. The horse industry plan of work, program implementation and program evaluation is designed by the state specialist planning in cooperation with Extension program leaders, Extension field staff, the Virginia Horse Council and the fourteen member breed and show associations, the state 4-H horse project advisory committee and other state organizations and related industry groups.

ECONOMIC SITUATION. The gross value of the Horse Industry in Virginia amounted to \$171,000,000 in 1976. The industry is a major agricultural industry expanding at a rapid rate and includes 75,000 owners, 130,000 horses, 22,000 employees, 7,500 breeding farms, 500,000 spectators, and 10,000 4-H horse project members. The horse is assuming a significant role in the economy of the state and provides the basis for a broad based recreational program. A wide variety of interests is involved with the industry. These include: the pleasure owner, the commercial breeder, the professional horseman; and numerous related support personnel such as farriers, feed suppliers, tack suppliers, veterinarians, insurance and financial agencies.

Virginia is truly horse country. The heritage dates to colonial days. The present features an expanding industry with growth in all breeds with the ability to produce quality horses of international acclaim.

The future is unlimited. Virginia has the natural and institutional resources for a high quality expanding program. The horse is popular with youth and the 4-H horse program continues to expand in enrollment and quality educational programs and events.

Virginia has great potentials but also faces many challenges toward development in the areas of breeder incentives, marketing, sales facilities,

communication, organization, increasing production costs, zoning, land-use, trail development, research, indoor show facilities, taxation, health, labor, nutrition, reproductive efficiency, management, facilities, import-export facilities, waste management, safety and knowledge base of owners, personnel and youth. A broad based educational program is required to enhance the economic development of this industry.

PROGRAM STATUS. The Virginia Tech Extension Horse Program is expanding at a rapid rate and may be divided into two areas: adult work and the 4-H youth program. The educational program focuses on problem solving work in cooperation with the horsemen across the state. The bulk of the program is conducted by Extension Agents located in all counties and several cities in cooperation with adult volunteer leaders. The state program, originating from field problems, is built around an interdisciplinary team involving the Animal Science, Agronomy, Agricultural Engineering, Architecture, Veterinary Science, Entomology, and Agricultural Economics Departments and the State 4-H Club Staff. The Animal Science Department employs one full time Extension Specialist, Dr. A. N. Huff, to serve as subject matter specialist for the adult and youth programs, chairman of the state interdisciplinary team, resource person for Extension Agents, coordinator of programs, and educational advisor for the Virginia Horse Council (VHC). Numerous Animal Science Department staff members assist in many ways with these programs.

ADULT PROGRAMS. The adult program goes hand-in-hand with the youth program and involves a continuous role in routine problem solving situations on a request basis such as nutritional problems, constructing facilities, etc. The Extension program has included five horse science schools across the state per year (one night per school for ten weeks) for the past few years. Approximately 600 horsemen have enrolled in this

program each year. Last year a three-day short course was held at VPI&SU in lieu of the schools and drew 300 horsemen for an intensive program. This will be continued in 1978. The state team has also developed a sizeable literature package pertaining to nutrition, facilities, parasites and management. Several publications have received national acclaim. Other work includes media programs, cooperative programs with schools, apprentice programs, shows, events and field days. VPI&SU publishes a monthly Horse Facts newsletter to 10,000 horse owners across the state.

Educational work with VHC and industry groups includes a monthly newsletter, news articles, and programs on a request basis. The National Horsemen's Seminar is co-sponsored by VPI&SU and VHC and draws well over 600 participants each year from most states and many nations. The seminar proceedings provide Virginia horsemen with the most current and valuable information that is available. The Council has been active with established committees in many areas of concern including trail development and youth programs. The Council maintains over eighty local advisors across the state.

Expansion is the tone of the educational program with 443 man days reported from the state Extension planning unit and 26,063 horsemen and horsewomen provided direct educational assistance in 1977. This should be compared to the 1973 year with 231 man days servicing 7,700 clientele.

SPECIAL PROGRAMS. Extension has reacted rapidly to provide horse owners with educational programs about drought assistance and emergency feeding and management programs. The industry has been hard hit in most areas of the state and the effect will be of a long-term nature.

Extension and VHC has assembled a catalog listing of 130 VPI&SU staff and volunteer horsemen and horsewomen to offer an expansive self-help educational base across the state for classes, seminars, and

short courses on a long term basis. Local programs will be arranged for by the County Extension Agents.

Extension working with VHC has assembled an educational package about land-use, trail development, zoning and ordinances. These are major areas of concern for horse owners in all areas of the state.

4-H HORSE PROGRAM. The Virginia 4-H horse program continues to expand in enrollment and number and quality of educational programs. Over 10,000 youths are enrolled in the program which is conducted by the VPI&SU Extension Service. Program leadership is given by Extension Agents in counties and cities and is coordinated by Dr. A. N. Huff, VPI&SU Extension Specialist. The program is conducted by hundreds of dedicated volunteer leaders and is supported by the horse industry across the state.

Emphasis is on the local project group for fun and educational programs. The educational emphasis is on learning, fun, horse science, horsemanship, recreation, and sportsmanship. Thousands of meetings, clinics, shows, rides, and educational programs are conducted at the local, county, and district level. The program is designed to focus on the needs and interest of each member and his horse.

Project work is the basis for the individual's program. Members may enter into the progressive riding series (basic, novice, horseman, and horsemaster) and advance as far as his need and interest will take him. Members may also elect to take other projects, including mare and foal, horse business, self-determined, and Horses Are Fun. The self-determined project is a new and innovative project which is designed by the member and his leader. The fun project is open to all youths, with or without a horse, and is the most popular project in the horse program. This project has been copied by several other states. Many school club programs and urban programs utilize the fun or "horseless" horse project. Alexandria has initiated a model horse show for this project.

A wide series of educational events and programs is open to the members. Some of these include demonstrations and achievement records, three district camps, state youth horsemanship school, several breed field days and judging contests, a state 4-H packing trip, a state 4-H competitive trail ride, a state 4-H pleasure ride, a state combined training event, and a show program. The program is all-breed oriented and is designed to use the horse as a tool for youth development.

Shows are an important part of the overall program and emphasize stable management, fitting and showmanship, and equitation. Hundreds of local shows are available; the program offers six district shows and a state show which offers classes for all breeds and types of horses and ponies and draws 1,500 entries each year. Bedford County fields a drill team which performs at many events across the state.

Judging training is conducted at the local level and is basic for all members. Approximately 300 members, junior and senior, enter the all-breed state judging contest. Virginia has fielded four national winning teams within the past six years. Many 4-H members go on to become highly qualified recognized judges. A new horse bowl program has been initiated for local, district, and state contests. The horse bowl program is a quiz type event using questions drawn from ten suggested reference books. Emphasis is on reading and serious study about all phases of horse science and horsemanship. Over 100 members recently competed in the Fairfax County horse bowl contest.

All 4-H members are encouraged to give demonstrations and demonstration contests are held at local, district, and state levels. Virginia 4-H'ers have won the Southern Regional Demonstration contest in 1975 and 1976. One of these winners, Carol Baird, Loudoun County, has developed her demonstration, "Equine Eyes" into a slide-cassette

series for statewide use. Carol was also a national 4-H horse project achievement winner. Jana Ozment, Loudoun County, was selected as a 1977 National 4-H Horse Project Achievement winner. Loudoun County has been innovative in establishing a 4-H riding program for the handicapped and a vaulting program. Orange County has recently implemented a handicapped riding program. The Northern District designed a new combined training program for 4-H members. Approximately 60 members entered the event.

The progressive riding series from basic to horsemaster provides for a continued learning experience. The horsemaster tests are difficult and include knowledge tests, dismounted and mounted tests. Trail riding is rapidly developing into an important part of 4-H, and 56 4-H'ers recently completed the sixth annual state 4-H competitive ride. This ride has promoted trail riding and 4-H members are competing quite successfully in many open rides. Virginia 4-H members will be preparing for the sixth annual state packing trip into the beautiful mountains of Carroll County on October 5-8. Carroll County initiated the packing program with the now famous ride named "When Mules Wore Diamonds To The Hole In The Mountain." Wythe County has also initiated a new state 4-H pleasure ride named "Going Up Cripple Creek." Virginia offers a saddlelog program and a shoulder patch for recognition of level or event. Two new publications, a leader's guide and a selection manual, were published in 1977.

The 4-H horse project enrollment has rapidly increased: 1966--3000 members; 1970--5100 members; 1974--6800 members; 1975--8500 members; 1977--10,000 members and still growing!

## CURRENT TOPICS IN EQUINE REPRODUCTION RESEARCH

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In the past 5 years, more research has been done in the area of equine reproduction than in the preceding 40 years. With the development of new assay techniques the hormonal control of reproduction has been studied extensively in the past few years. The influence of nutrition on reproduction has also received needed attention. The role of seasonal changes has been examined and several basic concepts have evolved.

### I. THE MARE

The mare has received the bulk of attention as she should. Scientists at various locations have fairly well mapped out the basic hormonal patterns in the mare's estrous cycle and found a great deal of variation exists among mares. Researchers are now attempting to manipulate the hormonal pattern to reduce some of this variability and thereby improve the reproductive efficiency of the mare.

One of the major problems under study is unpredictable time of ovulation during the estrous cycle. A solution to the problem is to inject a hormone known as HCG (human chorionic gonadotropin) obtained from pregnant women. This hormone acts to ovulate the follicle within 24-28 hours. The injections are routinely made on the second or third day of heat and the mare is then bred on the following day. This procedure results in a marked reduction in the number of times a mare must be covered in a heat period. There has been some indication that certain mares become unresponsive to HCG after repeated treatment. This condition is currently being studied by researchers at California.

Another area of concern to the breeder that is receiving attention currently is the "psuedo-pregnant" mare. This mare fails to respond to teasing for several months, yet is not pregnant. It has been shown that **this is usually caused by a 'persistant' corpus luteum** on the ovary. This CL for some reason fails to regress normally 14 days after ovulation and continues to produce progesterone. An injection of prostaglandin ( $\text{PGF}_{2\alpha}$ ) or a commercially available analog will cause the CL to regress and the mare will cycle normally again.

A somewhat similar problem has also been studied. Mares may show no outward evidence of being in heat or estrus but may be ovulating normally. In these cases the mare may be palpated routinely to follow the development of the follicle. When the follicle has reached an ovulating condition, the mare can be inseminated artificially. Often, HCG may be used here to insure ovulation takes place at the right time.

When we discuss ovarian palpation, the question often comes up regarding the reduction in fertility due to palpation. Studies in California have shown that if palpation is properly done, there is no reduction in conception rates.

If we could regulate the occurrence of estrus and ovulation in groups of mares, many of the management problems in breeding horses would be solved. Recent studies at Colorado, Wisconsin and Michigan have shown that the hormone like compound prostaglandin ( $\text{PGF}_{2\alpha}$ ) offers considerable promise. This compound

causes the regression of the CL and the return to estrus 3 to 4 days post injection. Using two injections 14 days apart, we can bring a group of mares into heat within 3 to 6 days of each other. Where artificial insemination is employed, having a number of mares in estrus at the same time allows maximum use of the stallion's semen. The stallion can be collected and the ejaculate diluted and 5-8 mares bred with that ejaculate instead of one. On the other hand, if we have a number of mares cycling naturally at the same time and we want to spread them out, prostaglandin can be used here also. To spread the estrous periods out, we can inject some mares with  $\text{PGF}_{2\alpha}$  in mid cycle, shortening the interval to the next heat period. These mares will then be in 'season' in between the others.

It should be mentioned here that the prostaglandins are not wonder drugs. They are only effective if the mare has a functional CL on the ovary. They will not cause a mare to start cycling in the anestrus season nor overcome disease or infectious conditions.

A major concern to horse breeders is the seasonal effect on the mare's cycling. Most mares do not cycle during the winter and early spring. This creates problems when we try to produce early, January and February, foals. A number of hormone treatments have been tried without much success. Since the breeding season is controlled by the length of daylight, subjecting the mares to artificial light has been quite effective. Work at the University of Wisconsin and elsewhere indicates that exposing the barren or maiden mare to 16 hours of light and 8 hours of darkness around the 15th of November will hasten the onset of estrous cycles by 6 to 8 weeks. California studies show that an abrupt change to 16 hours of light is just as effective as a gradual increase.

Further attempts to control reproduction have involved inducing parturition in mares with a synthetic corticosteroid, dexamethazone. Starting on day 321 of gestation, daily injections were given through day 324 or until parturition. The five treated mares foaled within two days, 322-324. The control mares foaled over a 22 day period. This technique offers the possibility of "scheduling" foaling to suit the management.

A problem rather unique to the mare and one that is of real economic concern is the mare that aborts about 3-5 months into gestation. A deficiency of progesterone hormone has been indicated as a possible cause. Several studies are currently in progress to examine the problem and determine if it is in fact a progesterone deficiency and if so, establish treatment regimes to correct the condition.

Multiple ovulations have been shown to occur in approximately 25% of the heat periods, a much higher incidence than was previously thought. Only 2-5% of these twin ovulations result in multiple conceptions. Ovarian palpation will detect this problem and it is recommended that the mare not be bred at that estrus.

The role of nutrition in reproduction has been of interest to many people. Current evidence reveals that conception rates are highest when mares are in a thrifty, gaining condition at breeding. This means a bit on the thin side, but gaining weight. Obese mares require more services per conception than trim mares. For the first eight months of pregnancy, a balance maintenance ration is adequate. It is only during the last 2-3 months that the mare requires additional nutrients due to pregnancy. The products of conception, fetus and

membranes, weight about 10% of the mare's body weight. The mare should gain about 5% during gestation. During the final 2-3 months, an increased level of protein and calcium and phosphorous will be needed to insure optional fetal growth, without fattening the mare.

Deficiencies of protein, calcium and phosphorous all can result in weak, defective foals at birth. It should be emphasized that excessive mineral supplementation can be equally harmful. Excess calcium and phosphorous can cause calcification of tissues, particularly heart muscle, in the fetus. Mineral supplementation must be in accordance with the published recommendations. The calcium and phosphorous ratio is as important as the amount of these minerals in the ration. The ratio should be between 1.1:1 and 3.0:1 calcium:phosphorous. It has been demonstrated many times in all species that obesity causes difficulties at birth.

There is no evidence to indicate that the reproductive process requires any special or exotic nutrient sources. A properly balanced ration of good quality feedstuffs fed at the correct levels will meet the nutritional needs of the mare for normal reproduction.

## II. THE STALLION

The stallion has not received the research attention accorded the mare. The limited work being done has centered around effort to establish the endocrine patterns controlling sperm cell production and sexual behavior of the stallion. The influence of season of the year has also been studied.

Research at Colorado State has shown that the stallion is definitely responsive to seasonal changes. Weekly semen collections were made over a 13 month period and evaluated. Semen production and libido both decline during the winter months and improve as the days become longer in the spring. Volume of semen and sperm concentration were lowest during December and January and reached a peak in June and July. Motility of the sperm varied throughout the year with no definite high or low points. These data indicate that the stallion can be overworked and exhibit reduced fertility much more easily early in the breeding season, February and March, than later in May and June when semen production is maximal. The estrous cycles of the mare are also much more erratic early in the year which compounds the problem.

Low fertility is most often the result of bad management. Overworked stallions may be subfertile due simply to a lack of viable sperm cells. Stallions that are used excessively as teasers without the opportunity to mate soon lose libido and fail to perform.

Nutrient requirements of the stallion have received limited research attention. At the present time, there is no evidence to indicate a special nutrient requirement for reproduction. A properly balanced ration of good quality feedstuffs that will maintain the stallion in good condition will meet the reproductive needs. Additional energy above maintenance may be needed during the breeding season due to the increased activity of the stallion. Again, the overweight, soft stallion will not be as aggressive a breeder as the horse in a trim hard condition.

HORSE SELECTION: JUDGING AND EVALUATION BASED  
ON VISUAL APPRAISAL

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The decisions we make in selecting horses are usually compromises. Most of us seem to develop a "champagne taste and beer wallet" problem if we stay involved with horses very long. Not only do our tastes become more expensive, but our knowledge makes us more discriminating. You have known buyers who simply asked to see "a nice riding horse" or a "small pony" when they bought their first horse. If they continue as horse owners for a few years you can bet their next purchase order will be more specific!

The compromises of selection are perplexing indeed for the serious breeder of horses. Not only the individual characteristics of a prospective mare or stallion, but its pedigree, performance record, family and disposition must be considered. The decision making process becomes more complex, as the horseman tries to predict a horse's genetic potential in search for inherited qualities which will be transmitted to its offspring. Dedicated breeders search for sources of information to use in culling and selection decisions--performance records, sale results, pedigree analysis, progeny tests, soundness examinations, etc. Even with the most sophisticated data available, however, the final decision is usually greatly affected - if not entirely determined - by visual inspection. The final decision to buy or sell is often more emotional than rational also, but that's another story!

Visual selection involves four main factors--type, conformation, soundness and action. These characteristics are highly dependent on each other, and all are essential to the evaluation process. We will focus on conformation in this discussion.

Conformation is more than opinion. Although halter classes in horse shows sometimes resemble a cross between a beauty pageant and a popularity contest, visual selection based on conformation and type can be a valuable tool for the breeder. The relation of form to function is the basis of intelligent selection. Horses should be evaluated as athletes, with particular attention to physical features that will determine the horse's ability to work and to withstand the stresses of work.

In today's cost-price crunch in animal production, it is necessary to make culling and selection decisions as early in the life span of the animal as possible. Costs can be substantially reduced by early culling, as fewer horses are tested in the expensive training process. Although actually selecting on performance is most accurate, this is most expensive and time consuming. Even though our main selection criteria will require the test of the track or the arena (breed fast horses that retire sound), conformation can be used to eliminate those prospects that are least likely to withstand stress. This places the percentages in the breeder's favor in both an economic and genetic sense.

The show-ring is not a satisfactory source of information for the progressive breeder. Halter judging is too often superficial, so that fatness, fitness, and popularity are overemphasized. Even success in performance classes leaves much

to be desired as a tool in selecting breeding stock. Many horses are consistent winners in pleasure classes for one or two seasons, and then are too sore, sour, and sullen to be useful afterwards. A breeder should strive to produce pleasure and youth horses with a long, useful life. Particularly in sire selection, a show or race record should be studied as objectively as possible.

Horse showing, in my opinion, serves primarily as a recreational pursuit and a promotional vehicle for the horse industry. Its greatest contribution from a breeding standpoint has been to alter type and to create market trends as type standards shift. Halter judging in particular seems to focus primarily on type and condition, with conformation and action receiving far less attention in most cases. This is unfortunate indeed because halter classes are missing much of their intended goal of breed improvement. The concept of raising better athletes through selection for specific physical characteristics was the original basis for halter judging. It needs to be brought back to the front.

If we are to improve show ring judging we must first recognize its weaknesses. Here, in my own opinion, are the greatest hindrances to effective conformation judging in the modern show ring:

Obesity - Horses too fat to ride and too fat for their own health. This fat covers the structures we are attempting to study, and yet is considered a prerequisite for halter classes.

Profile Judging - The profile view is important, but should never be the sole basis for placing a class. Unfortunately, spectators can usually pick the horses with more attractive profiles, but don't see calf knees and contracted heels.

Stretching - Posing certain breeds in an un-natural, exaggerated stretch is in keeping with tradition. Honoring this tradition makes structural evaluation of these horses almost impossible.

Corrective (cosmetic?) Shoeing - Halter horses are trimmed to stand straight regardless of how they move. Many are shod to produce an optical illusion concealing conformation faults. The idea is not to help the horse, but to deceive the judge.

Wandering and Shifting - Many exhibitors "allow" their horse to deviate from a straight line while tracking, and to move about in line. The judge is given an "impression" of the horse instead of an examination.

Promotion - Advertising, expensive equipment and famous personalities are at best stresses which make it more difficult for conscientious judges to concentrate on the job at hand. The Judge's sense of values is at stake.

Horsemen can avoid superficial judgment and confusion by learning to focus on those conformation features that are most directly related to usefulness. Horses make their living on the move, and skeletal structure determines both the horse's manner and efficiency of motion and his ability to withstand the stress, strain, and concussion of movement. By genetic selection based on conformation, a horse breeder can improve his horse's potential for both performance and soundness.

Our horse is a miracle of nature that evolved by the harsh process of natural selection. Under range conditions of sparse feed and water, the light horse grazed

over wide areas almost constantly on the move. Speed and stamina evolved as the horse's protection from predators. The instinct and ability for flight is a fundamental quality of the equine. In a natural state, horses with inferior feet and legs were rigidly "culled" by natural selection. A sore footed or crooked legged horse produced few if any offspring in the process of natural selection. Survival of the fittest was a perhaps cruel, but most effective law of breeding.

Today, man has replaced natural selection and chooses breeding stock to fit his own image of improvement. Horses have been "improved" to serve man, and this service is the species' survival value today. We provide feed and care to horses in return for their services in sport, work, and companionship. We need to breed horses for the market, but cannot afford to sacrifice the basic qualities that make a horse useful to man.

Many qualities affect the value of a particular horse. Size, color, temperament, training, pedigree, sex, age--to name a few--all determine market price. A breeder must consider many factors in his own program, but he must also concentrate on a few traits if he is to realize genetic progress. Since conformation affects the basic qualities of athletic ability and soundness to a marked degree, it deserves emphasis in any selection program. Only disposition commands equal attention in breeding improvement.

The fundamentals of good conformation are strikingly similar in all breeds. Some real differences exist because of the specialized use of certain breeds and simple breeder preference. The musculoskeletal systems of excellent performance horses--regardless of breed--are amazingly alike.

The problem in using conformation as a tool is to identify the features that are most useful and to use specific structural characteristics in selection. A sense of values or priorities is needed to weigh the effects of certain faults and features relative to total merit and usefulness of the horse. Fortunately, some research efforts are now attempting to make objective measurements of skeletal features and their effect on performance and soundness. We also need to know the heritability of specific conformation features in order to make breeding plans. Experience does show that specific conformation faults produce specific defects in stride or manner of motion. Since the horse earns his living on the move, it is clear to me that skeletal structure should receive maximum emphasis in visual selection and judging.

Horses have been known to maintain a speed of 15 miles per hour for 35 miles! Not only are they capable of efficiency of motion, but horses can also produce a burst of speed of 45 m.p.h. Horses are comparatively heavy-bodied animals to produce such speed. The impact of the horse's weight times its speed concentrates a tremendous concussion on a few square inches of hoof. How well the horse withstands this force is a major factor determining his useful life.

The limbs have three primary functions -- support, propulsion, and shock absorption. Because of the placement of the center of gravity, the forelegs bear about 65 percent of the horse's weight. Accordingly, lameness is more common in the front limb than the hind, and conformation faults of the front limb are ordinarily more serious.

Concussion is countered in several mechanisms which work together to protect the limb. In an animal of good conformation, shock is distributed through many structures. The slippage of the compound joints of the knee and hock, the pumping action of the foot, and the spring-like action of the fetlock are among the

more important shock absorbing mechanisms in the equine limb. Particular emphasis should be placed on skeletal correctness of these shock absorbing structures in selection. Factors which contribute to length of stride and trueness of action (freedom from limb interference) are also important in judging. In summary, our study of conformation should predict the horse's manner of motion and ability to withstand stress.

According to O. R. Adams, ideal conformation means proper length of bone as well as proper angulation between these bones. The high incidence of arthritis in working horses is proof that the joints undergo severe stress. The more nearly ideal the conformation of the joints, the more uniformly these stresses will be distributed and absorbed. Careful study of leg defects will allow an experienced horseman to predict how a standing horse will move and where lamenesses and unsoundness is most likely to occur. This knowledge allows us to select a horse to fit a particular job, and thus prevent much of the disappointment and economic loss of horses that break down after expensive training.

The slope of shoulder and set to the withers are features that deserve great emphasis. Length of stride, smoothness of ride, and agility depend on a long shoulder that is laid back into prominent withers. The length and set to the neck also have great bearing on athletic ability and balance. I believe that horses whose necks are shallow at the collar and trim at the throat usually develop more collection and ability to work off the haunches.

Upright pasterns are a serious and very common defect. In selecting for height and sprinting ability we seem to produce more horses with short, straight pasterns. This defect produces poor concussion-absorbing action in the fetlock, and concentrates shock in the navicular area. Bowed tendons are also associated with improper angulation in the pasterns.

Short cannons are desirable because of greater durability, and a more efficient stride. Low hocks definitely allow the horse to work off his hindquarters more easily. The forearm and gaskins should always be long in relation to the cannons. The set or straightness of the legs is also important. Such faults as toe-in, toe-out, base wide, base narrow, cow hocks and knock knees produce definite deviations in gait. Be especially careful to check the knee for proper size and set as viewed from both the front and side. Horses that toe out from the knee down are most likely to interfere and to develop arthritis. The defect known as calf-knees (back at the knee) is extremely serious. Similarly, horses with sickle hocks are very likely to develop curbs. Cow-hocked horses tend to twist their hocks in motion and may develop spavins.

Feet are the most neglected part of the horse's body in judging. Since the normal hoof plays such a vital role in both shock absorption and circulation of the lower limb, the old adage "no foot no horse" is real wisdom. A major cause of lameness in stock horses is the tendency of these breeds to produce heavy animals with relatively tiny feet. In search for "refinement," judges and breeders have favored horses with feet and joints that are too small to function properly. I believe that an increased incidence of navicular disease in recent times is a direct result of a trend toward heavily muscled horses with small feet, narrow heels, and straight pasterns.

Balance in conformation is both beautiful and useful. The horse whose proportions appear balanced and graceful is most likely to possess athletic balance, agility, and grace in motion. These qualities not only make an animal "classy" and appealing at the market place, but more pleasing under saddle.

Muscling is important to working ability, but the value of muscle mass or thickness is often overemphasized in the show-ring. The leverage provided by skeletal structure is the most important factor determining the effectiveness of any muscle for work. I would rather have a big man hit me with a newspaper than a little man hit me with an axe! Length of muscle is more important than thickness. Stock horses and sprinters do need well developed hindquarters with strong stifle and gaskin muscling for maximum propulsion. The length of hip, angulation of stifle and set to the hock, however, are more critical than thickness of the rear quarter. In human terms, our versatile athletes should look more like halfbacks and less like weight lifters or Sumo wrestlers!

Good judgment is required to decide which of two faults is more serious, and which of two horses has more total merit. Opinion does enter into the process, but the overall judgment should be built on an understanding of the dynamics of equine locomotion. The breeder who bases his decisions on such an understanding and consistently uses strict conformation standards in culling and selecting breeding stock will produce horses that are more athletic, durable, attractive, and valuable.

## HORSE FARM MANAGEMENT

By  
Jack Conner

The qualities needed in a farm manager are really no different from those needed to be successful in any other endeavor. They need only be oriented to the horse and the farm.

I would place honesty and integrity first on my list of qualities. Without these, none of the others really matter. It isn't just a question of being honest from a legal point of view. The honesty I refer to stimulates trust--by the owner, by other employees and by fellow horsemen. It is a 24-hour a day, seven days a week honesty, which is not compromised for a special situation.

The second quality to be looked for would be knowledge of the equine business. It is the blend of the two subjects, equine and business, that makes this quality unique. Too often, I have seen trainers doing double duty as managers. In most cases, they understand the horse, but not the vagaries of tax planning, labor management, building design, and construction, record keeping, etc. In contrast, the business-oriented person, not familiar with the horse and his needs, is soon knee deep in trouble. His plans, financial and physical, are usually a bit grandiose because he does not take into account that horses are living bodies with reactions and needs not found in packages, cartons, or truckloads of inert manufactured goods.

The manager of today's horse farm has to be blessed with many talents. It would be impossible to list all of the subjects in detail with which he should be acquainted. In a typical day, he can be involved in decisions concerning disease control, training problems, machine repair, insurance, breeding and/or foaling, tax records, seed and fertilizer needs, and advertising to name a few.

Each of these subjects may bring him in contact with other people--other employees of the farm or "outsiders." The ability to work with and motivate others is an asset that cannot be overlooked, and is an essential ingredient in a manager's total knowledge.

Nor should his knowledge be limited to one type of breed. Yes, he should be very well versed in the type or breed that the farm produces, but knowledge of the business transcends those artificial boundaries. I like to know what a successful breeder of Thoroughbreds or Quarter Horses is doing to improve his operation, although my principal interest is with another breed. Neither should a manager's knowledge be limited to today. His dossier should contain enough experience from the past to make his judgment and decisions sound. His devotion to the horse should be intense enough to make him search for improvement in the future.

I think it is wise for an employer to seek out a person with the expertise to operate his farm as he wants it in its final form. The manager should be capable of not only operating the farm today, but should be a leader in organizing and planning to attain the goals of the future.

Linked with knowledge of the equine business is another quality that I refer to as awareness. Awareness of the equine and its related business as an industry, (and, like any other industry, saturated with many variations of production and use of the product) is most necessary.

Being agriculturally oriented, I would compare it to the manufacturer of a farm tractor. Most tractors are of a very basic design, yet they are used for a variety of general uses and some very specialized ones. The successful tractor manufacturer keeps abreast of the times and anticipates the needs of the industry before the tractor goes on the drawing boards. He participates in industry exhibits, supports trade organizations with both physical and financial help, and acts as an individual company to build sales without bringing discredit to competitors or the industry.

The farm manager holds a very responsible position in the equine industry. His awareness of the present situation and future trends in the industry may mean the difference between success and failure. The awareness factor is evidenced in today's farm manager by his successful breeding program in producing a better horse for tomorrow, by his support of research in making horses and/or their records available for study, and by his continued efforts to help create and maintain a favorable image for his farm and the industry.

Finally, a farm manager should be willing to share all of these qualities buffet style. They can be put out in front and sampled by friend and stranger alike. They are good qualities, seasoned by use, and pleasing to both the server and the served.

## Record Systems for Horse Farms

By

J. T. Conner, Jr.

Horse farm records generally fall into two categories, those related to the business and involving cash flow or monetary charges and those relating directly to the horses and their care. Those records falling into the first category are primarily of an accounting type. They of course relate directly to income tax reports, estate planning and business analysis as well as plain and simple profit or loss statements. Their specialized and sometimes interrelated uses may require guidance by an accountant or an attorney.

This article is primarily concerned with those records having to do with the horses either on an individual or herd basis. No one set of records can be devised to meet all situations for all horses. The records should fit all aspects of your enterprise, be detailed enough to provide the information you will need without being so complicated that it discourages the keeping of the records and be systematic in that a time and a place are allotted for the record keeping and storage of records. A horse enterprise of a gelding or two can use a very simple system compared to a breeding farm with a large number of horses of all ages and stages of development requiring more details.

An additional important and often overlooked feature of a good record system is for want of a better term--continuity. By this I mean that the system should be able to be understood by all persons. In case of a change of trainers or manager, death of the owner or whatever, the records should be able to provide for that contingency.

For most operations the basic records should provide for at least the inclusion of vaccinations and health notes. The addition of any farrier work may be part of this section or made as a separate entry. This would depend on the scope of your records. Breeding farms will be using an expanded system to include teasing, palpation and foaling information.

Here at the farm we use a printed folder type record that is the result of looking at several kinds of records and combining them into one form that works for us. It is an extremely valuable tool of management and fits into our overall health program as well as being an integral part of our sales and accounting functions.

The health aspects of the system are quite direct. By incorporating our vaccination and parasite control program into the printed portion of the record it serves as a reminder before the work is done as well as record of when it was done and what material was used in these programs.

For medical records of the non-routine type, we use a separate section. In this, any observation of temperature, physical exam notes, laboratory test results and medication--including brand name, concentration and dosage are entered. Additional sheets can be made up as inserts to supplement this section. These inserts are used for cases requiring longer, more extensive treatments.

I would point out that accuracy, completeness and promptness are very important parts of this record. There is no way of telling when a routine case will "blow up" and become a real challenge for the veterinarian. The information on this record can save time as well as money and possibly the horse's life as the consulting vet then has a complete history to work with. One such experience will make a confirmed believer out of the most skeptical. (See figure 1)

Our records provide for a complete breeding history. The calendar with various symbols (p--palpation; c--culture; red--heat; blue--bred, etc.) provides a road map type of picture. The details of that map are provided on her supplemental sheet that is a record of the teasing and palpations. Abbreviations and a numerical code give us all of the available information regarding teasing response, ovarian activity, uterus tone and condition, and cervical evaluation. These are all factors used in evaluation and analysis of breeding condition. Again, it must be emphasized that these records must be complete and up to date if they are to be of any value. (See figure 2)

In practice, the person responsible for the breeding of the horse is the key man and should be the one doing the records. They are most likely to be the one involved in a good teasing program and present for veterinary checks and breeding activities.

Since we are handling quite a few mares, the stud manager makes up a list of horses to be teased. As these are done, he makes a simple written note by their name on his note pad. This is transferred onto permanent records later the same day, along with any notes or information if she was bred.

The permanent record does not go out of the barn during the teasing operation. The responsible person should not be involved in carrying and fumbling through a filing system. Observation of the horses is his task at this time and only notes are made. Since a good breeding program is based on a good teasing program, the daily observations of mare reactions are very important. In our system these reactions are judged and evaluated for the most part by one person. Therefore the entry of "h" for hot has a high degree of similarity when entered into the records of any mares on any day.

The palpation results are entered on the mare's record at the time evaluation is made by the vet. We do this because it reduces the chance for error. There are various parts of the repro-

ductive system involved, the time for each exam is relatively short, and usually we are doing several mares on any given day. We have a hinged shelf that becomes a recording desk right at the chute. Again, the record is a vital part of our overall management system and is used in analyzing and decision making.

In breeding operations, the keeping of records regarding mating of horses is required by breed registries. It should be an accepted responsibility regardless of requirements by any breeder. This record is the basis for registration, stallion reports, determining foaling dates, etc.

Information from this section can also help in determining breeding efficiency. We are all quick to recognize the value of records in regard to mares. Do not overlook their usefulness in determining your stallion management program. The number of services per pregnancy is one evaluation you can make that could affect your subsequent breeding practice.

There are some additional factors that must be taken into account when making a system out of record keeping. The word "system" does denote orderliness, similarity and continuity. To achieve this systematic approach a place to store the records must be provided. Whether you use a file cabinet or a designated place on a shelf will depend on the number of records involved and should be coordinated with where you do your record keeping. Most stables having a tack room use a corner of it as a business center including record keeping.

Continuity is provided by a simple file folder for each horse. Each year's record is added to the file. It is then quite easy to determine the last Coggins test, date of a booster shot, or number of days she carried previous foals.

As referred to earlier this continuity is extremely important in breeding operations. The larger farms are more apt to use hired help and are subject to changes in personnel. Records can be very important to these transitions.

There is one aspect of the records that should not be overlooked in any system and its real values apply to continuity. I am referring to identification. The starting point for the records should be an accurate complete description of the horse including all markings, permanent scars, brands, etc. When making the description, a good guideline is to come up with one that a complete stranger would be able to make an identification from your description.

There are innumerable uses for accurate well kept records. The amount of time spent is really not very much on a per-horse basis and does not require any investment in high cost equipment to achieve results. Take a few minutes to look over your operation and set up a system to provide you with answers you can count on.

Year .....



# Rapidan River Farm

LIGNUM, VIRGINIA 22726 • PHONE 703-825-8327

**HORSE'S NAME — REG. #**

.....

**OWNER'S NAME**

.....

Sex: .....

Date Foaled: .....

Color: .....

Sire: .....

Dam: .....





NAME \_\_\_\_\_

**BREEDING AND TEASING HISTORY**

**+ IN - OUT B BRED T TREATED AI ART. INSEM. C CULTURE S SPECULUM P PALPATE PR PREGNANCY**

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Dec.																															
Jan.																															
Feb.																															
Mar.																															
April																															
May																															
June																															
July																															
Aug.																															
Sept.																															
Oct.																															
Nov.																															
Note																															

**DIET AND FEED INFORMATION**

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Foal due \_\_\_\_\_ Foal born \_\_\_\_\_ Hour \_\_\_\_\_ Sex \_\_\_\_\_ Color \_\_\_\_\_

Notes: \_\_\_\_\_

**FOAL'S HISTORY**

---

1st day

---

2nd day

---

3rd day

---

4th day

---

5th day

---

6th day

---

RAPIDAN RIVER FARM  
LIGNUM, VA.

Year \_\_\_\_\_  
Page \_\_\_\_\_ of \_\_\_\_\_

Mare \_\_\_\_\_ Color \_\_\_\_\_ Age \_\_\_\_\_ Farm No. \_\_\_\_\_  
Mare  
In 19 \_\_\_\_\_ Booked to \_\_\_\_\_ Owner \_\_\_\_\_

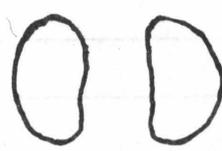
Results of Last Year's Breeding \_\_\_\_\_

TEASING & BREEDING CODE:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
+ in - out B Bred	Dec.																													
T Treated	Jan.																													
AI Art. Insemination	Feb.																													
C Culture	Mar.																													
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P Palpate	May																													
Pr Pregnancy	June																													
F Foaled	July																													

	DATE	TYPE	VET.	RESULTS
Tests for Pregnancy				

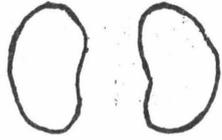
PALPATION CODE:

ts (teasing): Out Indifferent Fair Good Hot  
 cx (cervix): Progressive numbering ranging from 1, up & closed tight to 4, down & open  
 fs (follicle size): Progressive numbering ranging from 1, small beginning follicle to 4, large mature follicle  
 fc (follicle consistency): tight soft fluctuating (Breedable) ovulated

Date _____ Remarks _____  ts: O I F G H cx: 1 2 3 4 fs: 1 2 3 4 fc: t s f o  Uterine tone _____		Date _____ Remarks _____  ts: O I F G H cx: 1 2 3 4 fs: 1 2 3 4 fc: t s f o  Uterine tone _____	
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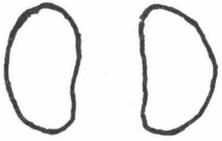
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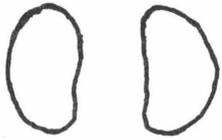
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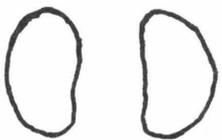
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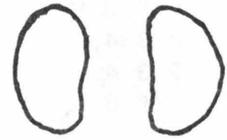
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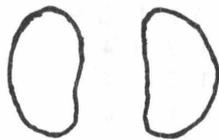
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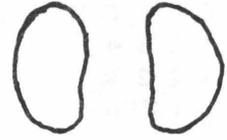
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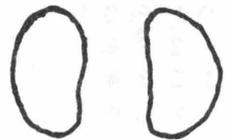
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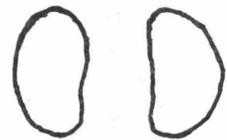
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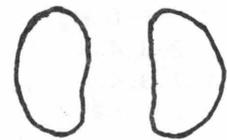
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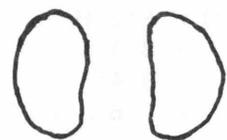
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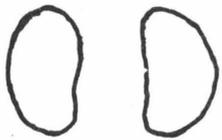
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## BREEDING MANAGEMENT AND ARTIFICIAL INSEMINATION

By  
J. T. Conner, Jr.

Artificial insemination usually referred to as "A.I." is one of the management tools available to the horse breeder. It is not a secret weapon or a cure all offering spectacular results. It has its uses and limitations like any management practice and these should be evaluated to determine if A.I. will be advantageous to you.

A program of A.I. offers the opportunity for more efficient use of the stallion as the primary advantage. Breeding programs, (and here I am referring to the genetic part as well as the physical breeding program) are usually built around the use of a stallion to a large number of mares, either farm owned, outside mares, or a combination of both. In breeding these mares at the optimum time for each individual, natural covers will result in periods of over use of the stallion and the resulting lower conception rate of the mares during that period of over use.

Mares coming into heat and remaining in heat for extended periods of time which would multiply breedings plus the overlapping of heat periods that will occur, are conditions that are not really controllable on the breeding farm. In an effort to get as many mares as possible in foal, the stallion manager is then faced with the choice of which mares to breed and which ones to "leave until tomorrow," or skip completely for that heat period in an effort to use the stallion semen to best advantage in a natural breeding program. Remembering that a stallion's semen production is physically limited by the cellular structure of the testes, and that sperm goes through a maturation period of approximately two weeks, over use of a stallion will result in a deterioration of the sperm quality and may result in permanent (especially in very young or advanced aged stallions) sterility.

A normal ejaculate of a stallion will range from 50-100 cc of semen and contain from 5 to 20 billion sperm. The principal factor of A.I. is to collect this material, and divide it so as to provide about 500 million motile sperm per mare. Therefore, a number of mares can be bred without subjecting the stallion to over use and the accompanying dangers. This process is not as simple as it may sound, and we will discuss this later.

The second advantage to A.I. is disease control. The reproductive tract of the mare and stallion are ideal incubators for pathogens. The natural breeding process encourages the spread of these pathogens. Witness the spread of contagious equine metritis (C.E.M.) and the resulting loss of the entire

1977 breeding season to the famous National Breeding Program of Great Britain, as an example of the potential damage that may be sustained by the spreading of venereal infections even in well managed, natural breeding programs.

An A.I. program should be set up with "zero contamination" as the goal. All equipment is maintained in a sterile condition if possible, or at least as clean as possible. Use of disposable items is encouraged to reduce the chance of contamination and they do reduce the labor needed to keep items clean. The semen itself may be diluted with an extender containing antibiotics, further reducing the chance of contamination.

In this realm of disease control there is a fact that is hard to document with research figures, but does make sense. In natural breeding with a 50 cc ejaculate, millions of bacteria may be introduced into the mare's reproductive tract. Although the mare's system could control this organism in a less concentration, she becomes infected because of the large number. With A.I. the clean collection process, treatment with antibiotics and the fact that only a few cc's of material is used, the chance of infection is minimized.

Other factors that might be considered an advantage for A.I. are: permits the use of older stallions with age induced infirmities or the use of injured stallions, promotes the use of a better teasing program, usually accompanied by a program of palpation, and results in a better system of records.

On the negative side of the ledger is the cost factor. Initial costs of equipment and supplies will vary greatly, but a minimum of \$1,000.00 and more realistically \$1,800.00 - \$2,000.00 in direct expense, will be incurred. The additional costs and inconvenience of preparation, care, and cleaning of equipment should also be considered. A well run A.I. program will be more costly than the traditional breeding out behind the barn.

The operator must decide on the basis of the number of stallions and mares involved, the expected schedule of breedings to a stallion, (not just total number) the physical condition of the stallion, the availability of both the facilities and knowledgeable (or trainable) personnel, and the acceptance of the fact that A.I. is not a cure all for all of the breeding problems. It is a management tool and its benefits depend on proper usage.

Obviously if you are associated with a breed that does not permit A.I. produced foals to be registered, your choice has been eliminated. For the breeds that do permit it, there are variations in the rules and regulations that must be complied with. It is your responsibility to be aware of those conditions and to comply with them.

In the operation of an A.I. program, most of the interest is centered on the stallion. However, the mare is still a necessary part of the business. The timing of the breeding is very crucial, therefore the teasing program is very important. We tease mares every other day up to the time they begin to exhibit signs of estrus or "heat". They are then teased daily until they are "out" or in the diestrus portion of the cycle. This program minimizes the chance of missing the mare that has a short or unusual cycle. Also, it gives us the pattern of each individual mare which is so important in judging when to breed that particular mare. We have one mare that will exhibit external heat signs for only one day. Conversely, there are those whose cycle will be of six days duration and be considered normal for that particular mare. For one, you must move quickly to palpate the internal breeding organs and to accomplish the breeding. The mare with the longer normal heat, could be left to the 5th or 6th day for servicing.

Our mares are palpated by an experienced vet to more accurately assess the condition of the internal reproduction organs. The ovary and its follicle or egg, the uterus, and the cervix are palpated and evaluated. The time to do this is usually indicated by teasing. The information obtained is always put in the written record of that mare. The decision of when to breed is made primarily on the basis of the findings from teasing and palpation. Primarily, the candidate for breeding has a large follicle on the ovary ready to rupture, the uterus has good tone and judged to be free of pockets, indicating infection, and the cervix is relaxed and free of adhesions.

Obviously all of the variations in the mare's breeding conditions are present in the A.I. program as well as the natural breeding operation. Most A.I. operators report a greater awareness on their part of these variations which they credit as contributing to a higher conception rate. It has been noted in many instances that the first year A.I. is used the conception rate decreases, but is followed by an increase.

Also, it should be pointed out that mares going out of heat and that would not stand for natural breeding without extra restraint, can be bred artificially with little or no trouble. Since the follicle is usually shed in the later stages of the heat cycle and there is a tendency in natural breeding to delay the cover in order not to "waste" the stallion; this could account for getting a few more mares in foal on the 1st service and result in better efficiency.

Assuming that we have a breeding situation as determined by the teasing and palpation, we then proceed to the collection, processing, and insemination. This is usually scheduled for the afternoon. The time itself is not important but the scheduling is. Since our teasing and palpation is done in the morning, the information obtained has been evaluated and the

decision made. We then know how many mares are to be bred and the appropriate people know what horses will be involved. The mares are assembled at the breeding barn by the handlers.

The system we use for collection, involves two major practices that have proven to be essential. The first has been referred to before as "zero contamination." We can not achieve operating room sterility. However, we strive to approach that as closely as economics and practicality will permit. Equipment that can be autoclaved is kept sterile, paper and plastic throw aways are employed to avoid reuse and reduce clean up time, and all equipment and the environment in the semen lab is maintained as clean as possible. It should be kept in mind that most soaps and disinfectants that kill bacteria will also kill sperm. Therefore, all residues of these products must be removed from surfaces coming in contact with the semen.

The second practice that is crucial to the A.I. program is maintaining the temperature of all equipment coming in contact with the semen at body temperature to avoid "cold shock." An incubator of sufficient size to accommodate the glassware and equipment is used for storage; a warming tray for slides used in microscopic examinations, and a supply of hot water through a mixing faucet with an accurate thermometer are the principle components of this portion of the system.

In the collection of semen, we use what is called a Japanese A.V. (artificial vagina). It has the advantage of being easy to handle, provides good temperature control, and replacement parts are not too expensive.

Two other models of A.V.'s are available. We feel that the Haver-Lockhart A.V. does not provide enough temperature control and is not very adaptable for filtering of semen. The Colorado A.V. is much too cumbersome and is costly to maintain.

In assembling the A.V. care must be taken in the installation of the liner. This is the rubber insert within the metal case. It will have water between it and the metal case to maintain temperature within the A.V. That water also provides the pressure necessary to promote ejaculation by the stallion. There must be no leakage of that water into the semen since one drop of water can kill most of the sperm.

Experience with each stallion will indicate to the person in charge, the proper amount of water to be put in the jacket to create the ideal pressure. It is the combination of the temperature and pressure on the penis of the stallion that will cause him to ejaculate. Stallions will evidence individual likes and dislikes. In order to obtain ejaculation within a reasonable time and a complete ejaculation producing an acceptable amount of semen, these individual whims must be observed.

A definite pattern should be followed in handling and preparing the stallion. He will become accustomed to it very quickly, and behavior problems will be minimized, and the entire breeding operation will be less hectic. Team work will develop between the handlers which will minimize the chance of injury to man or beast, and insure that all of the details are carried out in the proper order.

While the A.V. is being assembled, the stallion handler is preparing for collection. It may be necessary to have a mare present for teasing. This will cause the stallion to "drop" and the penis will be exposed for washing.

The penis of the stallion is washed thoroughly, using a mild non-oily soap, such as Ivory, that will rinse off easily. Roll cotton is used in the washing process. Used cotton is discarded and never returned to the bucket of soapy water. For rinsing, we use copious amounts of warm water applied with a stainless steel cup. The force and the amount of water does a better job of rinsing than you can accomplish with more cotton or other applicators. The head of the penis is immersed in the cup of water to insure removing the soap from the diverticulum.

With the stallion prepared and the A.V. assembled, we are ready for the actual collection. In our system, the stallion is conditioned to mount a phantom or dummy. This is a padded log mounted on two pedestals (front and rear). The outside cover is plasticized canvas, tough enough to withstand abuse and smooth enough to be washed between stallions. Training the stallion to this procedure is not very difficult. The stallion that we use in A.I. has not mounted a mare in 3 years. The dummy does not kick or attempt to run out from under the stallion with the ensuing commotion and danger of injury.

As the stallion mounts, a pre-ejaculate fluid will be discharged. This is not collected. Following this discharge, the penis is inserted into the A.V. and the collection is made. The person handling the A.V. has to be agile enough to move with the stallion and avoid getting stepped on by the hind feet, or getting hit with a flailing front foot, and to be sure that the stallion does actually ejaculate.

The A.V. with the captured semen is taken into the temperature controlled semen lab for immediate processing. Since our A.V. is equipped with a filter to remove the gel, the collection bottle will contain only the gel-free semen. This is emptied into a pre-warmed measuring cylinder. The amount (in cc) is recorded.

From the cylinder, a sample is removed by pipette and two slides are prepared for microscopic examination. Primarily, the slides will be examined to determine the number of motile sperm. This will be estimated as a percentage of the total number of

sperm present in the viewing field. Motile sperm for this count will be those that are moving vigorously and in a relatively straight line.

This microscopic examination would also indicate the presence and number of abnormal sperm. Increased amounts of malformed or immature sperm would indicate other troubles that would bear further investigation.

Another measured sample would be drawn from our collection and placed in a measured amount of formalin solution for measurement of the total number of sperm. The formalin and semen samples are placed in the spectrometer and a reading obtained indicating the amount of light passing through the sample. This machine has been previously calibrated and the reading obtained can be converted to give us a figure for the number of sperm per cc of ejaculate.

By combining this figure with the percentage of motile sperm present in the microscopic examination, we can determine the number of live, motile sperm per cc of material. For example, the spectrometer indicates a total count of 230,000,000 sperm per cc. By microscope we determine that we have 70% motility. Therefore, we have 161 million "usable" sperm per cc.

It has been determined by research that 500 million motile sperm per inseminate produces the optimum number of pregnancies. With that as a guide, we would need 3.1 cc of this semen for each mare to be bred. If this stallion had produced a total volume of 70 cc of gel free semen, it would be possible to breed twenty mares with this collection.

Independent from these computations, is the addition of the extender to the semen. The extender is a source of food for the sperm and is a carrier for the antibiotic that reduces any possible contamination of the semen and subsequent infection in the mare.

The recipe we use was obtained from the University of Pennsylvania. It consists of a basic mixture of 100 mil. 5% glucose, 2.4 gr. Sani-Lac, 150,000 units each of crystalline penicillin and streptomycin.

This mixture can be prepared in quantity, divided into 50 cc packets and frozen. Be sure and allow enough time for the mixture to thaw and reach 35 degrees C prior to use.

This extender is added to the semen in an amount equal to the volume of semen. Fifty cc of semen would use 50 cc of extender.

Keep in mind that all the computations we made regarding the 500 million sperm is based on semen volume only. Therefore, we must double the volume of material after the addition of the extender. The 3.1 cc's of semen plus 3.1 cc's of extender would result in 6.2 cc's of material being inseminated.

The semen is drawn into a sterile syringe in the pre-determined amount. A breeding pipette is then attached to the syringe with a short piece of rubber tubing which gives a flexible connection between the syringe and pipette. We purchase the syringe, pipette, connector, and a plastic breeding sleeve in a sterile container.

The mare is thoroughly washed and rinsed, tail wrapped with a clean bandage or tail wrap and restrained for breeding. We use a chute for breeding which restricts the mare's movements and does not require much additional restraint.

The inseminator grasps the end of the breeding pipette in the gloved hand, being careful to shield the end of the pipette in the palm and between the slightly curled fingers. This hand is inserted into the vaginal tract. The shielding of the pipette will avoid the chance of irritating or puncturing the vaginal wall. After entry is made, the inseminator will locate the cervix and initiate entry of the pipette into the cervix. This organ is really a series of constricting muscles. By manipulating the tube and syringe end, these constricting rings can be passed and the end of the pipette will then be in the uterus. The syringe is then slowly discharged causing the semen to be placed in the mare's uterus. Semen is fragile and may be damaged if the syringe is emptied too quickly.

The hand and pipette is then withdrawn in a downward motion. This will reduce the amount of outside, contaminated air entering the vulva and vagina. After a little practice, this inseminating can be accomplished in three minutes or less.

All of the equipment used in breeding must be washed, rinsed, sterilized, dried and stored. Records of the semen collection as to volume, motility and use are made for the day. Breeding charts of the mare are completed. None of these details can be put aside.

From this description, you can realize the use of A.I. is not easy. To achieve the desired results, a lot of details must be taken care of. The expense of laboratory equipment can be considerable. The time involved in collecting can be greater than that used in a single, natural breeding.

The rewards are there in the form of better utilization of the stallion, a more intense disease control program, reduction in the danger of injury to a valuable breeding horse, and development of a more intense breeding program from teasing to record keeping.

## Current Topics in Agricultural Law - A Summary

J. W. Looney\*

Recent legislation activity at both the state and federal levels has resulted in changes in laws that are of concern to all property owners. The 1977 session of The General Assembly added a provision allowing for the formation of Agricultural and Forestal Districts in the state. This provision may be of particular interest to those who own property located near urban areas. In addition, the Virginia General Assembly changed some important aspects of the property inheritance statutes in the state. At the federal level the 1976 Tax Reform Act made some dramatic changes in the estate and gift tax provision of the Internal Revenue Code. These changes are important to all property owners, but, again, may be of special interest to those who have real estate located in areas of expanding population where pressures for the conversion of farm and agricultural property to other uses are greatest.

The Agricultural and Forestal Districts Act of 1977 (Va. Code Ann. §15.1-1506 *et seq.*) specifically states that the policy of the state is to "conserve and protect and to encourage the development and improvement of its agricultural and forestal lands" and to "conserve and protect agricultural and forestal lands as valued natural and ecological resources which provide essential open spaces for clean air sheds, as well as for aesthetic purposes." (Va. Code Ann. §15.1-1507)

The legislation allows owners of land to apply to local governing bodies for the formation of districts to be designated agricultural or forestal districts. If it is determined that the proposed district meets the qualification detailed in the law, the local governing body may adapt the plan by an ordinance.

Once the district has been established, a number of significant effects results. First, the land within an agricultural or forestal district will qualify for use-value assessment even if the county as a whole has not adapted a county-wide use-value assessment plan.

In addition, restrictions are placed on both local governments and state agencies prohibiting certain actions without full and complete consideration of the affect on farm structures and forestry and farming practices. For example, before an agency can exercise the power of eminent domain to condemn land located within a district, the effect on the preservation and enhancement of agriculture and the state policy must be considered and it must be shown that the proposed action is necessary to "provide service to the public in the most economical and practicable manner ...." (Va. Code Ann. §15.1-1512) Similar restrictions are placed on other proposed activities within an agricultural and forestal district.

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The impact of this legislation will not be felt for some years and may in fact be relatively minor. However, it does seem to emphasize the state's interest in the preservation of farmland.

Another important change by the Virginia General Assembly relates to the dower and curtesy rights of the surviving spouse at the death of either husband or wife. Under prior law, if a husband or wife died owning real estate in his or her own name, the surviving spouse could claim as a dower or curtesy interest a lifetime interest in one-third of the real estate. This life interest would terminate at the death of the second spouse. At that time this one-third of the real property would pass to the first spouse's heirs as determined by will or by state law if the first spouse had died intestate. Effective July 1, 1977, the surviving husband or wife may claim as dower or curtesy a one-third absolute interest in real property owned solely by the first spouse to die. This change has important estate planning implications for many families--particularly those in which either or both spouses own property in their individual names.\* The implications go beyond mere property disposal of property but may affect tax liability for some families. A reevaluation of the family estate plan is in order.

On the federal level the 1976 Tax Reform Act included the first major changes in the federal estate and gift tax laws since their enactment. These changes are of particular concern to owners of farm real estate. Many of the changes apply generally to all estates, but some have special application to farm property.

One of the major changes applicable to all estates was in the marital deduction. The federal estate tax law has always allowed a certain amount of property to pass to a surviving spouse free of tax at the death of the first spouse. Previously, the amount that could pass to a surviving spouse without being subject to the estate tax was one-half of the adjusted gross estate (that is, one-half of the amount subject to tax after all other deductions). While this provision has been considered one of the most important estate planning tools available, many small estates were still subjected to the imposition of the tax. Congress changed the marital deduction provision in order that a larger amount could pass to a surviving spouse at the death of the first spouse without tax. Effective January 1, 1977, the marital deduction is either \$250,000 or one-half of the adjusted gross estate, whichever is greater. For example, if a husband dies with an adjusted gross estate of \$600,000 the maximum allowable marital deduction would be \$300,000 (one-half of the adjusted gross estate). However, if the husband's adjusted gross estate amounted to \$400,000 the maximum marital deduction would be \$250,000. In no case may the marital deduction exceed the amount actually passing to the surviving spouse at death of the first spouse.

One consideration in using the new marital deduction is that in some cases the maximum allowable amount will be reduced because of prior use of the gift tax marital deduction. Since large inter-spousal gifts may be made before application of the federal gift tax, some families will need to make adjustments in the maximum allowable estate tax marital deduction to take into account previous gifts in which the gift tax marital deduction was claimed.

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\*The dower or curtesy provisions do not apply to jointly owned property which often passes to the survivor by right of survivorship.

A second important change of general application in the 1976 Tax Reform Act was the establishment of a unified gift and estate tax schedule. Previously, gifts were taxed at lower rates than transfers of property at death. That is no longer the case. Under the new law, not only are gifts and estates taxed at the same rate, but lifetime gifts are taken into consideration in determining the proper tax rate at the time of death. Much of the advantage of using gifts to transfer property to a younger generation was removed by this change.

In addition to unification of the tax rate schedule for gifts and estates, the 1976 Act also established a unified credit for property passing by lifetime gift or at death. This credit is applied against the estate tax after a "tentative" tax is calculated based on the value of the estate above all exclusions and deductions (including the marital deduction). The credit of 1981 and thereafter is \$47,000. This is the approximate amount of tax that would otherwise be due on an estate of \$175,625. Again, the credit is unified and will apply against lifetime gifts or transfers at death or a combination of both. By application of the marital deduction and the unified credit two "rules of thumb" may be stated. For a single individual no federal estate tax will be due unless the person's estate value exceeds \$175,625 (after 1981 with somewhat lower amounts until then). For a married couple no federal estate tax will be due at the death of the first spouse to die unless the person's estate value exceeds \$425,625 (after 1931).

For persons whose estates exceed these amounts, additional tax planning may be necessary. For persons with smaller estates, a reevaluation of the present estate plan may also be in order.

One provision of the 1976 Tax Reform Act has special application to owners of farm property. This is the "special valuation" option. Generally, in calculating the value of the estate for tax purposes, the full fair market value of all items in the estate is used. Under the new law certain property may qualify for special valuation for estate tax purposes. Real property used in farming may be valued at its value in farm use rather than for other non-farm purposes such as sub-divisions or commercial development. This provision is of special interest to those whose farm property is located near expanding metropolitan areas.

To qualify for special valuation the farm property must make up at least 50% of the decedent's gross estate (reduced by debts and expenses) and at least 25% of the adjusted gross estate must be farm real estate. In addition, to qualify, the real property must have been used as a farm for five of the eight years prior to the decedent's death by the decedent or a family member who "materially participated" in the farm business. In order for the executor to have the option of using the special valuation, the property must pass to a qualified heir--generally a member of the decedent's family.

To obtain the full benefit of the special valuation option the farm property must be kept within the family and continue to be used for farming for fifteen years after the decedent's death. If it passes out of the family for reasons other than death of the qualified heir or if it is no longer used for farming purposes during the fifteen year period following the decedent's death, recapture provisions apply which require payment of all or part of the estate tax that otherwise would have been paid had the special valuation procedure not

been used. One limit is placed on using the procedure. The valuation option cannot be used to reduce the estate by more than \$500,000.

Caution should be exercised in deciding whether to elect the special valuation option. It will obviously be to the benefit of some estates to use the election, especially where the land is likely to remain in the family and in farming for some time. In those cases where the possibility exists that the land will be converted to a non-farm use in the foreseeable future, additional calculations need to be made to determine whether the election is in the best interest of the estate.

It is particularly important to consider the election in light of two other important changes in the 1976 Tax Reform Act--the alternative fifteen-year tax deferral provisions and the "carry-over" basis provisions of the income tax law. The first of these--the 15-year deferral--may be of great benefit to many families. This provision provides for deferred payment of any estate tax for a period of time up to 15 years following the decedent's death if a major portion of the estate is made up of closely held business property. If 65% of the adjusted gross estate of a decedent is made up of closely held business property, any estate tax due may be deferred for 5 years and then paid in installments over a 10-year period. Interest is imposed at a 4% rate. This provision may benefit those families whose assets are primarily farm business property. However, if the special valuation election is used, the 65% test may not be met and the advantage of this option may be lost.

The second important consideration is the "carry-over" basis provisions of the new law. Generally, when a person sells property the income tax due on the sale is calculated after determination of the person's "basis" in the property. The basis is essentially the original cost plus the cost of any improvements less depreciation claimed on those improvements. Upon sale, capital gain tax is paid on the difference between the sales price and the tax basis. If the original owner gives the property away, the basis passes to the donee. If the donee later sells the property, the capital gain tax is based on the difference in the sales price and the tax basis passed to the donee from the donor.

Under prior law, when a person died owning property, the property acquired a new basis when it passed to the heirs equal to its fair market value at the time of the decedent's death. This would reduce the capital gain tax if the property was subsequently sold by the heirs. Under the carry-over basis provisions of the 1976 Tax Reform Act, for property acquired after December 31, 1976, by the decedent and passing to an heir after that date, the decedent's basis is "carried-over"--i.e., passes with the property--just as it would if the decedent had transferred the property by gift during his lifetime.

For property acquired by the decedent prior to December 31, 1976, the carry-over basis is essentially the value of that property on December 31, 1976, with additional adjustments for state and federal estate and inheritance taxes due on the property at the decedent's death. The Code includes a detailed procedure for the determination of the December 31, 1976, value and for the other allowable adjustments.

In light of this important change, closer scrutiny must be made of the possible election of special valuation for farm estates. If special valuation

for farm property is taken and if the heirs later sell the property, the potential income tax impact may more than offset any advantage gained by the special valuation option.

These important--and in some cases drastic--changes should serve as incentive for all families to reevaluate their existing estate plans to determine if additional tax planning may be necessary to accomplish their estate planning objectives.

## BUY A HORSE - NOT TROUBLE

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So you want to buy a horse! It should be a simple matter to look at a few horses and select the one that appeals to you. Unfortunately, it's not that simple. A prospective horse owner with little or no experience in buying or owning a horse can very easily acquire an animal that does not satisfy his or her needs. The decision to acquire a horse is only the first step in a sequence of events that should be followed. The purchase of a horse represents a long term investment. For this reason, future plans and expectations as well as immediate needs and interests must be carefully evaluated.

The first question to be answered is; do you really want to own a horse? There are a number of factors to be considered before making the decision to assume the responsibilities along with the many pleasures of horse ownership. The purchase and maintenance of a horse is not expensive. Ownership involves not only the outlay of money but also a daily investment in time and effort. Unless you are willing to devote the time and effort required by the care of a horse on a daily basis, possibly at the expense of other activities, it is questionable as to whether you should consider owning a horse.

The next consideration is whether you can afford to own a horse and if so, how much can you afford to spend. The price of horses, tack, equipment, etc. varies considerably. It is very easy to overextend resources to the point where efforts to conserve can result in poor stable facilities, inadequate feeding, etc. with severe consequences. Analyze your own financial situation and know how much you can afford to spend. Then keep your expenditures within the established limits.

Investigate the facilities and services that are available in your area for the maintenance and use of the horse. Can you stable the animal on your own premises or must you use boarding stables? Are veterinary services, farrier services, feed sources, bedding, etc. easily secured? Is there a place for exercising the horse, trail riding, showing, or whatever activity you may choose to engage in readily accessible? Will you need a trailer? Are there ongoing activities in the area involving other horsemen? All of these factors should be considered in making the decision to purchase a horse.

After giving all of the facts thorough consideration and deciding to become a horse owner, what do you do now?

You must prepare yourself as well as possible before buying an animal. Learn as much as possible about horses and horsemanship. It is only by being knowledgeable about horses that you can make a sound decision about the kind of riding you prefer and, therefore, what type of horse will best serve your needs. Read all of the good material you can secure from libraries, bookstores, and Extension Offices among other sources. Visit breeding farms, horse shows, and any other event involving horses and riders. Observe the different types of horses and kinds of riding. Talk to experienced horsemen.

The more information you gain the better chance you will have of selecting the type of horse and activity that will result in the greatest satisfaction.

When you have decided what kind of activity interests you the most, you can then know what will be expected of the horse. These expectations can significantly influence the selection of the animal that is ultimately purchased. As an example, if trail riding interests you, the performance criteria used to select the animal will be quite different from those used in selecting a horse for competitive riding, informal pleasure riding or equitation riding on gaited horses. The age, sex, and often the breed of the animal should be matched with its intended use.

It is also advisable to match the horse with the rider as well as with the expected activity. It is self-evident that purchasing an untrained horse to be used by an untrained rider would be a gross error. Young children and large horses or adults and ponies make poor combinations. The temperament as well as appearance of the horse should be appealing as well as matched to the one who will be riding and caring for the animal.

The actual purchase of the animal should be made from a reliable source. If there are any doubts in your mind about your ability to select a good horse, consult with experienced horsemen with good reputations and discuss it with your veterinarian. They will all be happy to assist you. It is always best to take the time and make the effort to secure a good horse initially rather than be compelled to change later due to a mistake in selection. The final decision, however, must be made by the one who is spending the money and will use and care for the animal.

When you have decided how much money you wish to spend and what kind of horse you prefer, you are ready to start the process of locating the animal. The most usual sources of horses are auctions, dealers, breeders, and private owners. Each has its advantages and disadvantages. The novice, however, should be aware of the danger of buying a horse at public auction or from a dealer. The horses may be assembled from over a wide area. The history of each animal is usually unknown. Many are put into a public auction because the previous owner did not want it and used this method of getting rid of it. There is usually no guarantee made and once bought the animal cannot be returned or exchanged. When horses of unknown origin are assembled, the danger of one introducing a disease to the others is always present. The horse you buy may be exposed to a disease or parasite at the sales barn and show no symptoms until long after you have taken him back with you. Vices, lameness, and unsoundnesses may be disguised by clever handling or missed by the novice. Records of previous immunizations are absent. Even experienced horsemen find it difficult to buy horses at public auction with any degree of confidence.

Other types of sales such as breed sales, consignment sales, or private auctions may be better able to provide you with the type of horse you have in mind. The novice, however, would most likely be well advised to find a private individual, possibly a breeder, who is reliable. It is this source that most likely will be able to provide you with a valid health and vaccination record and will give you the necessary time to evaluate the animal through several visits. The seller in this case is more apt to be concerned about repeat

business so that a satisfied customer is essential to his business.

When you have located a horse that you believe you might be interested in, stop by to see him unannounced. This will give you a chance to see the horse and examine the stable without any previous preparation by the owner. First, look at the stable. Are there any marks on the walls or doors to indicate he kicks? Is there evidence of cribbing? Is he eating straw bedding?

Observe the horse as you approach the stall. Is he alert when he hears or sees you? Does he lay his ears back or put them forward? If he lays the ears back, it may be a sign of a bad disposition. When you near the stall, does he turn to face you or turn away from you? If he turns away from you, he may be dangerous in that he may have the habit of kicking. When the stall is opened, does he charge through the door trying to get away or does he stand and wait to be caught? Does he act as if he mistrusts people? This can be a serious problem particularly to the novice. If any of these problems are noticed, it might be well to leave the animal and look elsewhere.

When you enter a stable as a prospective buyer look for any signs of disease in any of the horses stabled there. Do you hear coughing, observe running eyes or noses, or anything else out of the ordinary? If you note anything abnormal, there is a good chance that the horse you buy may also have the same symptoms, if not now, then later.

Request information on vaccinations. Has the horse been vaccinated against Eastern and Western Equine Encephalomyelitis, Tetanus, and Venezuelan Equine Encephalomyelitis? Has the animal been on a parasite control program? Has he been tested for Swamp Fever (Equine Infectious Anemia--E.I.A.)? It is best to have some tangible record rather than the word of the seller unless you are absolutely certain of his or her reliability and integrity.

Observe the horse as he is led out of the stable. He should walk immediately without evidence of lameness. If any sign of lameness or soreness is evident, be suspicious. Some horses show lameness when first moved but warm out of it after a while and appear to be sound. An unannounced visit will prevent the seller from working the horse before you arrive. Look closely at the eyes. When the animal is led from the stable into the light, the pupils will contract very quickly if vision is normal. They should be clear with no cloudiness or tearing. Pick up the lips to determine whether the horse has an undershot jaw or parrot mouth. If you can, examine the molars to detect any spicules or unevenness. This can interfere with eating and pose a problem that will have to be corrected.

Examine the horse at a distance from the front, rear, and sides while standing. Look for swellings, bumps, capped hocks, differences in the joints, placement of feet and legs and any other observable abnormalities. You may wish to explore the structures with your fingers to discover possible abnormalities, blemishes, scars, etc. Have the horse led toward you and away from you at both a walk and a trot. Observe the gait and compare it to what you have learned from your previous study is normal.

Have the horse worked under saddle at a walk, trot, and canter until he is well warmed up. Check his breathing after the workout. If he has the

heaves, it will be apparent at this time. Note his actions. Does he seem reluctant to leave the area or bolt for the stable? Observe his manners while under saddle. Does he toss his head, fight the bit, take the proper leads, etc.?

Finally, ride the horse before buying him. Does he respond the way you expect your horse to respond? How does he accept a strange rider? Is he upset more than he should be? It is desirable to ride him several times. This gives both you and the horse a chance to become accustomed to each other and relax. This provides a better opportunity for a fair evaluation of the horse rather than depending upon a single short ride with a complete stranger in the saddle.

It is extremely important before making the final decision to purchase the horse that you have the animal examined by a veterinarian. He is best able by virtue of his training and experience to check the general health of the horse, lameness, unsoundnesses, blemishes, teeth, eyes, evidence of previous illnesses, and all of those things that might escape the notice of the layman. Experienced horsemen very frequently utilize a veterinarian prior to purchase. It is even more important for the novice to secure a veterinarian's examination before making the significant investment that the acquisition of a horse requires.

We have attempted to direct attention to a number of considerations that enter into the purchase of a horse particularly by someone with little or no experience. This is by no means a complete listing of those details that should be taken into account. Learn all you can about horses and horsemanship, utilize assistance that can be provided by experienced horsemen and your veterinarian. It is only in this way that you can acquire a horse that will give you the great pleasure and satisfaction that ownership and use of a horse offers.

## REDUCING THE COST OF HORSE PRODUCTION

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Increased costs of livestock production are a major problem confronting the entire agricultural economy. Horse owners and commercial horse producers in particular are feeling the same kinds of economic pressure as other sectors of the livestock industry. In particular, costs of major inputs of production, including land, labor, facilities, fertilizer, energy, and feedstuffs, have risen sharply in recent months and this increase has not been reflected in the market price of the commodities produced. It is my opinion that horse producers, as a group, have done less to modify their systems of production in order to minimize productive costs than any other commodity producing group. For the hobby horse owner, this is a problem but perhaps not so serious as it is for the commercial producer who needs to show a profit to survive. This is the group to whom I am addressing most of my comments in this paper, although the principles should be of benefit to all horse owners who seek to enjoy their hobby with less expense.

Horse production systems are usually devised according to tradition, with little attention to efficiency and economy. Our horse farms often feature a heavy investment in stable and other buildings that simply are not justified by the actual needs of horses. Management and care of horses also tends to follow tradition, with too much effort and cost devoted to stall cleaning and stable maintenance. It is time to take a new look at our horse operations, and to think in terms of a "systems approach" to breeding and raising horses.

In the southeast, we need to take advantage of the unique potential offered by our climate. In particular, systems maximizing the use of forages can reduce costs while maintaining the quality of a healthy athletic horse. The enclosed table shows relative nutrient production of various forages at different months. A system can be developed to use both permanent and temporary grazing to balance nutrient production according to your needs.

It is time to think in terms of developing a total system of production geared to a specific product and then adapting our methods and our breeding stock to the system. This word "adaptation" is a key concept. We have learned that some brood mares, for example, are much better adapted to a system in which they live outdoors all year and produce a foal on a minimum of grain. Other mares simply don't seem able to handle the pressures of climate and exposure. As such, these mares require more cost of feed, labor, and facility to produce the same product as their sisters in the same field. Culling horses offers the most immediate way to reduce total cost. First, by reducing the number of horses being handled and fed we make our most significant reduction in cost. Almost every breeder in the country has some mares that aren't paying their way. Eliminating these mares brings an immediate and substantial reduction in cost. In other species of livestock, we have learned to appreciate differences in climatic adaptability. For example, heat tolerance in cattle varies widely between breeds and within breeds. It is time to identify these factors in the horse population and to work toward developing strains of horses which can do the best job in a particular system of production.

Increasing the percent foal crop will also make a substantial difference in the profit and loss picture of any horse operation. The management required to do this job requires us to begin with a healthy set of horses and then to practice good breeding management on a daily basis. As one experienced horse breeder has stated, "Good management consists of doing the usual unusually well." I believe that this statement is true. We do need new facts to be obtained from research in horse breeding and management, but there is much progress available to the person who simply applies what is already known in a conscientious manner.

At the University of Georgia, we are working on a production system for developing Quarter Horses in an outdoor environment with forages serving as the primary nutrient source. The key feature of the system is the use of temporary winter grazing to provide much of the nutrition needed by foals during the period from weaning until spring of the yearling year. Since these horses are growing most rapidly at this time, it is a critical period in terms of their development and an expensive period in terms of cost. Use of temporary winter grazing (rye, ryegrass, and regal clover) established at a cost of approximately \$70 per acre will allow us to winter these foals on winter grazing plus grain at a level of approximately 1% of body weight. With a stocking rate of one foal per acre and a grazing period of six months, these youngsters can be developed at a total feed cost of approximately \$20 per head per month. In the winter of 1976-1977 these foals developed satisfactorily in spite of very unfavorable weather conditions for winter grazing. During the first half of the grazing period average gains of 1.14 lb. of weight per day and 0.75 in. of wither height per month were recorded. Cold temperatures and low rainfall limited early spring forage production, but we were still able to increase stocking rate in April to a peak of 13 yearlings on 9 acres of the winter annual crop. Final gains for the six month winter period were 137 lb. body weight (0.76 lb. per day) and 4.1 inches in wither height. These horses are now beginning training under saddle and we are pleased with their dispositions and responsiveness so far.

The 1977-78 winter grazing period has been favored with excellent weather conditions so far. Both animal performance and stocking rates are exceeding those of last year, as would be expected. We are continuing this project at our Extension Horse Demonstration unit in Athens, and hope to improve our knowledge of stocking rates, management requirements, and market potential of horses reared in this manner. We have noted few disease problems in these foals and certainly have enjoyed a substantial savings in labor and facility costs. I am interested in comparing the social development and trainability of these outdoor wintered foals to those which are handled in a conventional manner. At this time, we cannot recommend this system as something that has been proven, but it certainly is of interest.

Since feed cost represents the largest outlay in the operating budget of most horsemen, all horse owners should look at this area of productive and maintenance cost as an opportunity to save. Obviously, it is always false economy to sacrifice feed quality and nutrition as a means of saving. The following discussion will give you a check list of possibilities to effect feeding cost savings. The nutrient tables included will also be helpful as you check your feeding system against the best present knowledge of animal requirements and make ration changes in response to changes in feedstuff prices on the market.

#### Tips to Reduce the Cost of Feeding Horses

For most horse owners feed costs represent the greatest cash outlay required for maintaining and producing horses. In today's cost-price crunch situation, it

is more important than ever to find ways to reduce the feed cost on horse farms. The bright spot in these circumstances is the fact that almost all horse owners could improve the quality of nutrition of their animals and reduce expenditures at the same time. The following management methods offer some possibilities for saving money while insuring that each horse is provided the best possible nutrition to fit its own needs.

1. Health care - A healthy horse always will require less feed and will provide greater satisfaction for the owner. A good preventive health program, including proper use of immunizations, sanitation and close observation, will do much to save on feed cost.

2. Dental care also can go a long way in saving feed. All horses should have their teeth checked periodically. Young horses may have trouble when permanent teeth erupt, while almost all older horses will have to have their teeth "floated" annually in order to remove sharp points on the molars which will interfere with proper chewing.

3. Controlling internal parasites is another key step in improving performance while saving money on feed. Most horses in Georgia should be wormed at least four times a year in order to minimize parasite loads. Bloodworms or strongyles, ascarids and bots all should be considered in a good parasite control program, including the use of drugs, pasture rotation and careful handling of manure.

4. Utilize pastures efficiently - In order to provide good nutrition at a minimal cost, year-round grazing is possible and, although not inexpensive winter pastures will usually provide nutrients at a lower cost than will hays and grains. Use good plant and soil management, including fertilization, clipping, pasture rotation, reseeding and good hay harvesting practices in order to maximize the use of high quality forages for horses.

5. Balance least-cost rations - As market prices change the nutrients needed by the horse can be provided from a variety of different feedstuffs. The best farm managers use a sharp pencil in order to change their feeding formulas as prices fluctuate.

6. Use bulk handling of feed grains - Handling feeds in bulk in rodent-proof and waterproof bins is efficient, labor saving and allows the manager to purchase basic feed grains in quantity at harvest time when prices are lower. Storing feed grains also may be economical if storage is available on the farm or can be rented at a reasonable cost.

7. Feed horses by weight, not volume - Almost all of us fall into the habit of measuring feed by coffee cans rather than in pounds. This makes it difficult to adjust feeds accurately or to make changes in rations smoothly and safely for the horse. Learning to calculate rations and weigh feeds will improve feeding management.

8. Use supplements effectively - In order to take maximum advantage of roughages and certain basic grains, it will be necessary to supplement protein, vitamins and minerals under some circumstances. Corn, for example, usually provides the cheapest units of digestible energy but will require supplemental protein and vitamin A in most diets. Free-choice supplementation of calcium and phosphorus, trace minerals and salt will provide good nutritional insurance for all horses at all times. This is particularly vital to pregnant broodmares and to growing foals.

9. Cull - Reducing the numbers of horses being fed will make the biggest impact on the feed bill. Most horse farms have some horses that are poor producers or free boarders. Also, hard-keeping individuals that require more feed than other horses doing the same work need to be considered carefully. Unless these horses justify the additional feed cost by outstanding performance or production, they should be culled. Also, mares that are difficult to get in foal are expensive to own, since we tend to feed them for two or more years in many cases in order to produce one foal.

10. Be observant - The eye of the master is still one of the most important ingredients in any good feeding program. A skillful horse owner or manager who really cares will be quick to notice horses that are off feed or have health problems. An observant horseman will be most able to feed horses as individuals, providing the right quality and quantity of feeds to meet their individual needs.

ESTIMATED POUNDS TOTAL DIGESTIBLE NUTRIENTS PRODUCED PER ACRE BY VARIOUS CROPS

Period	Fescue Clover	Coastal Bermuda	Common Bermuda	Bahia	Small Grains and Ryegrass	Coastal Plus Crimson	Coastal Plus Overseed with Annual Grasses and/or Legumes	Common Plus Overseed with Annual Grasses and/or Legumes
Nov.-Dec.	300	138	92	138	1,600	240	240	240
Jan.-Feb.	150	-	-	-	720	800	600	600
Mar.-Apr.	800	1,020	442	680	2,550	1,500	2,025	2,025
May-June	750	4,640	2,200	2,378	490	4,340	4,030	2,400
July-Aug.	350	2,860	700	500	-	2,860	2,860	700
Sept.-Oct.	350	1,512	910	1,092	400	1,000	1,000	910

TABLE 1: DAILY NUTRIENT REQUIREMENTS OF ADULT HORSES  
1100 LBS. MATURE WEIGHT

Type of Animal	Digestible Energy Mcal	Protein lbs.	Ca gm.	P gm.	Vitamin A I.U.	Daily Feed* lbs.
Non-working	16.4	1.31	20.0	15.6	12,500	16.5
Medium work	28.69	2.31	21.3	16.0	12,500	23.0
Pregnant mare (last ¼ gest.)	17.35	1.60	24.0	18.0	25,000	16.0
Milking mare	27.62	2.90	47.0	38.6	25,000	23.0

\*Daily feed allowance is based on feeding coastal bermuda hay at 0.5 to 1 percent of body weight to non-working, medium working and pregnant mares, or alfalfa hay to milking mares and adding appropriate concentrate rations shown in Table 8 to meet energy requirements. The total feed requirement in any particular situation will depend on the relative allowance of hay and concentrates.

TABLE 2: NUTRIENT REQUIREMENTS OF ADULT HORSES  
1100 LBS. MATURE WEIGHT  
TOTAL RATION CONCENTRATIONS\*\*

Type of Animal	Digestible Energy Mcal/lb. feed	Protein %	Ca %	P %	Daily Feed lbs.
Non-working	1.00	8.0	0.27	0.21	16.5
Medium work	1.25	10.0	0.20	0.15	23.0
Pregnant mare (Last ¼ gest.)	1.10	10.0	0.33	0.25	16.0
Milking mare	1.20	12.6	0.45	0.36	23.0

\*\*Concentrations of nutrients needed in the total ration will depend on relative amounts of hay and concentrate fed. The higher the relative amount of concentrate fed, the higher the nutrient concentration must be since total feed intake will be reduced. These figures represent the minimum concentration of nutrients needed to meet nutrient requirements in the amounts of total feed indicated. Where both hay and grain are fed, nutrient concentrations in grain rations will generally have to be higher than that in the total ration.

TABLE 3: DAILY NUTRIENT REQUIREMENTS OF GROWING HORSES  
1100 LBS. MATURE WEIGHT

Age	Body Wt. Lb.	Daily Gain** Lb.	Daily Feed* Lb.	Digestible Energy Lb.	Protein Lb.	Ca gm.	P gm.	Vit. A I.U.
3 months	242	2.42	8.32	12.07	1.84	30.4	19.0	4,400
6 months	495	1.76	11.85	15.40	1.76	46.0	28.7	9,000
12 months	715	1.21	13.44	16.81	1.65	26.1	17.3	11,000
18 months	880	0.77	14.3	17.16	1.54	23.0	16.2	16,000
42 months	1100	0.00	16.4	16.39	1.31	20.0	15.6	12,500

\*See Table 1.

\*\*These growth rates are suggested minimums. Some young horses will grow at a faster rate if desired and if fed accordingly.

TABLE 4: NUTRIENT REQUIREMENTS OF GROWING HORSES  
TOTAL RATION CONCENTRATIONS\*\*\*  
1100 LBS. MATURE WEIGHT

Age	Body Wt. Lb.	Daily Gain** Lb.	Daily Feed* Lb.	Digestible Energy Mcal/lb. Feed	Protein %	Ca %	P %
3 months	242	2.42	8.32	1.45	22.0	0.80	0.50
6 months	495	1.76	11.85	1.30	14.85	0.85	0.53
12 months	715	1.21	13.44	1.25	12.3	0.43	0.28
18 months	880	0.77	14.3	1.20	11.0	0.35	0.25
42 months	1100	0.00	16.4	1.00	8.0	0.27	0.21

\*\*\*See footnote to Table 2.

TABLE 5: NUTRIENT CONTENT OF SELECTED HAYS

Hay	Digest. Energy Mcal/lb.	Protein %	Ca %	P %	Vitamin A* IU/lb.
Legumes					
Alfalfa (mid-bloom)	0.91	15.39	1.21	0.19	5448
Alfalfa (mature)	0.79	12.24	0.64	0.14	2584
Lespedeza (pre-bloom)	0.91	16.02	1.02	0.23	—
Lespedeza (full bloom)	0.84	12.06	0.93	0.20	—
Clover	0.89	15.21	1.27	0.16	5726
Grasses					
Bermuda (Coastal)	0.79	8.5	0.41	0.16	5972
Timothy	0.79	7.4	0.37	0.16	1766
Brome (mid-bloom)	0.78	10.6	0.36	0.18	1962
Brome (mature)	0.75	5.2	0.38	0.20	785
Orchard grass	0.75	8.0	0.36	0.29	4842
Meadow	0.66	8.1	0.51	0.15	—

\*Values for Vitamin A activity in hays as given here represent maximums if hay is of excellent quality and fresh. Hay that is over six months old and of average to poor quality has little or no Vitamin A activity. Consequently, concentrate rations as shown in Tables 8-11 are supplemented to supply most, if not all, of the daily Vitamin A requirement.

TABLE 6: NUTRIENT CONTENT OF SELECTED GRAINS

Grain	Digest. Energy Mcal/lb.	Protein %	Ca %	P %	Vitamin A Equivalent IU/lb.
Oats					
36 lb/bu.	1.27	12.01	0.09	0.32	—
34 lb/bu.	1.25	12.1	0.09	0.32	—
32 lb/bu.	1.25	11.56	0.09	0.32	—
27 lb/bu.	1.19	12.0	0.09	0.32	—
Corn	1.62	8.9	0.02	0.31	1362
Barley	1.48	11.6	0.08	0.42	—
Sorghum Grains	1.43	11.0	0.03	0.29	—

TABLE 7: NUTRIENT CONTENT OF SELECTED HIGH PROTEIN FEEDS

Feed	Digest. Energy Mcal/lb.	Protein %	Ca %	P %	Vitamin A Equivalent IU/lb.
Soybean Meal	1.43	44	0.32	0.67	—
Cottonseed Meal	1.37	41	0.17	1.31	—
Linseed Meal	1.38	35	0.4	0.82	—
Pelleted Supplements	Nutrient content will be specified on the feed tag. Most will fall in the range of 22 to 35 percent protein.				

## MANAGING FORAGE PLANTS FOR PASTURE AND HAY PRODUCTION

by

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The horse is, by nature, a grazing animal. Long before man decided to feed it hay and grain the horse depended on grazing the grasses and legumes provided by nature.

Too often, horse owners do not take advantage of pastures to provide high quality, low cost feed for their horses. While harvesting the pasture plants by grazing the horse is eliminating the need for expensive, energy consuming harvesting and storing equipment. At the same time it is getting exercise and fresh air, while providing its owner with pleasure just by seeing it out on green, lush pastures.

Nutritionally, well managed pastures will maintain mature horses with little or no grain. Young animals, those doing medium to heavy work, or those being prepared for shows and contests need grain and hay along with pasture.

High quality pastures are not produced accidentally. They are the result of good management practices. It is distressing to see fine horses behind well-kept fences grazing on weedy, thin pastures due to lack of proper fertilization, grazing management, and other management needed to develop and maintain productive pasture plants.

Making the assumption that a reasonably strong pasture sod is present, there are several management practices which need to be followed if that pasture is to be productive.

Fertilization is a "must" for pastures. How much and how often depends primarily on the nutrient status of the soil, intensity of grazing, whether or not hay is harvested from the pasture, and the type of plants in the pasture.

Taking a series of representative soil samples from the pasture in question is the first step in determining the amount of fertilizer and/or lime needed. The Extension Agent in each county has supplies and directions for this procedure. The state universities (Virginia Tech) maintain soil testing labs and there are a number of commercial labs available.

The results from these soil tests will indicate the amounts of lime, nitrogen, phosphate, and potassium needed. The soil pH (acidity) should be 6.0 to 6.4 in pastures. For example, if the soil test indicates the soil pH in the pasture is 5.7, this is too acid for grasses, and especially legumes, to grow well. Therefore, about two tons of ground agricultural limestone should be applied per acre.

The phosphate and potash levels in the soil should be maintained at not less than a medium level as determined by soil test. As a very general "rule of thumb", this will require an application of 50 to 70 lbs. of each per acre each year. This fertilizer can be applied at any time of the year, but the best time is from October to March.

Nitrogen fertilization of pastures will stimulate the grasses to make rapid growth and will give them a dark green, vigorous appearance. However, nitrogen application will also result in the clover plants being crowded out because of

the rapid growth of the grasses. Since the clover plants provide nitrogen for the grasses and improve the nutritional value of the pastures, it is usually desirable to maintain clover in the pasture. Thus, it is generally best not to fertilize pastures with nitrogen if at least 30% of the pasture growth is clover plants. If nitrogen is applied, normally the rate is 50 to 60 lbs. per acre in early spring and/or fall.

Grazing Management of pastures is important because it determines the degree and frequency of defoliation of the plants. This, in turn, affects the vigor, productivity, and quality of the plants. Horses are, by nature, spot grazers. They select certain areas in a pasture and keep it grazed down because the short plants (below 2 inches) are young and tender compared to older ones. This presents a problem to the manager because plants in other parts of the pasture which are not grazed closely by the horses become tall, low in quality, and crowded by weeds.

Overgrazing occurs when horses are permitted to continue to graze a pasture even after the plants are eaten down to the ground. This severely weakens the plants, reduces the growth that they can make, and in extreme cases will result in loss of stand. Parasite infestation of the horse is also generally more serious if pastures are kept extremely closely grazed. To prevent overgrazing, the manager must remove horses from closely grazed pastures and allow the plants to recover to a height of 4-6 inches before grazing is resumed.

Undergrazing is also a problem in many horse pastures, particularly if land is not a limiting factor. Often, no more than 1 horse is grazed for every 1 or 2 acres of pasture, which means that more grazing is produced than can be eaten. Undergrazed plants become tall, stemmy, low in quality, and crowded by weeds. The desirable clover plants find it difficult to survive in the tall growth. Periodic mowing (at least twice per season) helps to keep undergrazed pastures in good condition. Permitting cattle to graze with the horses or following them also helps to utilize the excess growth.

Manure Distribution also contributes to undergrazing since horses usually refuse to graze around manure piles. Using a chain drag or similar implement to spread the manure helps to correct this situation. This operation also will help to control parasites and will make the fertilizer value of the manure more uniformly available to the pasture.

Weed Infestation in pastures may become a problem. These undesirable plants lower the quality of the pasture and rob the desirable plants of necessary light and moisture. Weed invasion is usually a result of poor fertilization and/or grazing management. The use of herbicides such as 2,4-D are effective in controlling many of the broad-leaved weeds if it is applied when they are small. However, this also will kill the clover in the pastures. Proper fertilization, grazing management, and clipping before weeds produce seed are the best practices for controlling weeds.

Overseeding may be used to introduce new plants into the pasture sod with only a minimum of soil and plant disturbance. This can be best done to pastures in late February or early March when they are grazed very short. Clover seed can be simply broadcast on the surface during this time using a grain drill, a sod seeder, or disking lightly and then seeding.

## HAY MANAGEMENT

Many of the same plants used for grazing can also be harvested, dried, and fed as hay. Plants such as orchardgrass, tall fescue, timothy, and red clover are used for both hay and pasture. Often the spring growth is harvested for hay and the regrowth grazed, especially in dry seasons when summer growth is limited. Alfalfa is not usually used for pasture, but is an excellent hay plant.

Plants harvested for hay generally need to be fertilized more heavily than those used for pasture. Very few nutrients are removed from the field by a grazing animal, but when the plant is harvested and removed as hay, many more nutrients leave the field. The only way to develop a sound fertilizer program is to rely on soil sampling and use the results as guidelines for fertilization.

Applications of phosphate and potash fertilizers can be made any time of the year on hay fields, but the period from October to March is best. If nitrogen fertilizer is being applied to grass fields such as timothy or orchardgrass which have no legumes present, a split application works well. For example 70 to 80 lbs. of nitrogen could be applied along with the fertilizer in March and an additional 70 to 80 lbs. of nitrogen per acre may be applied after the first cutting of hay is harvested to increase the yields of second and third cuttings.

As everyone knows who has attempted to produce or buy hay, high quality is often elusive and difficult to obtain. There are so many variables involved in producing hay that it is not surprising that such a wide range in quality exists. Understanding the factors involved in producing hay and knowing how to evaluate it will help you to provide high quality horse hay. The following are several general production factors affecting hay quality.

Species of Plants Cured for Hay - Legume hay such as alfalfa is generally higher in protein and minerals than grass hay. Red clover is another legume commonly used for hay but is often dustier than alfalfa and lacks alfalfa's green color. Grasses such as orchardgrass and timothy also make high quality hay and are often grown in a mixture with legumes. Most of the commonly grown domestic leafy grasses and legumes make high quality hay. Weeds, or undesirable plants, lower hay quality by adding woody material low in acceptability and digestibility, as well as contributing bad tastes or odors.

Growing Conditions - Hay grown during a drought may be stunted and less leafy than that grown with adequate moisture. Excessive moisture, on the other hand, often produces diseases which attack the leaves and may reduce leafiness. Plants grown under adequate fertility have a higher nutrient content and are more leafy and lower in fiber than those grown under low fertility.

Stage of Plant Growth at the Time of Harvest - As grasses and legumes advance from the vegetative to the reproductive stage, they become progressively lower in protein content, digestibility, and acceptability to livestock. This is the direct result of increased stemminess and fewer leaves, resulting in a higher fiber content. Legumes should generally be harvested when beginning to show a few flowers. Grasses should be harvested in spring when seed heads are beginning to appear.

Curing Conditions - If the hay is allowed to dry or "cure" in the field, rains and sunlight often reduce quality. Rains beat leaves from the legumes, leach nutrients from the leaves, and pack down mowed material to prevent proper drying. The crop thus soaked often begins to deteriorate before drying occurs. The sun further bleaches the leaves, resulting in losses of Vitamin A and in the "bleached" appearance of such material. Hay stored before being properly

dried will usually develop a musty, moldy odor. The molds present may be toxic to animals.

Harvesting Procedures - Hay allowed to completely dry in the field before raking into windrows for baling loses many brittle leaves in the raking process. Ideally, the stems should be crushed or "conditioned" at the time of mowing for more rapid drying and left in the windrow for drying. This avoids the necessity for raking which often shatters many leaves and mixes dust and dirt with the hay.

## PLANNING FACILITIES FOR HORSES <sup>1/</sup>

H. A. Hughes <sup>2/</sup>

Development and management of facilities are important activities for horsemen. The selection of building designs, the facility location and the arrangement of individual structures affect the ability of the operator to manage effectively. Carefully planned, well designed facilities make horse care easier and add to personal satisfaction and riding enjoyment.

There are three essentials when planning or purchasing a horse facility:

- \* Know what is needed.
- \* Know how to provide what is needed.
- \* Stay within the budget.

Unfortunately, many horse facilities are not really designed. Rather, they grow and evolve from some existing arrangement as owners change or as the needs and goals of an owner are modified. The result of this lack of planning is the large number of horse facilities that: 1) are overly expensive, 2) have high labor requirements, 3) may be unsafe for animals and/or humans, 4) do not provide a healthful environment for the animals, and 5) lack the flexibility that allows modification to suit new needs or new owners.

Well planned facilities provide for the health and safety of the horses and the people who work with them. Buildings should be of sound construction, use appropriate labor saving conveniences and be styled to suit the surrounding area. The setup should be properly designed for the particular operation that it will house, but expansion or renovation options should be kept open. Very few systems are used for the original purpose throughout their life. Plan carefully before you build or renovate. The same kind of sound basic planning is needed when selecting a barn for two horses as for a larger number.

Many styles and sizes of barns and a wide variety of other equipment options are available. The remainder of this paper will discuss some of the options and indicate criteria that can be applied when selecting a particular item from the array of available types.

### LOCATION

Factors that will influence the location of a horse farm include: 1) land availability and cost, 2) accessibility, 3) availability of feed and water, 4) zoning, 5) one or more suitable building sites, and 6) personal considerations.

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<sup>1/</sup> Article prepared specifically for the Third National Horsemen's Seminar, Williamsburg, VA 1978.

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Land cost and availability are obvious considerations. You will want to hold land cost down so that capital is available for construction of buildings and other facilities. Availability depends to some extent on the price you are willing to pay. The location should be accessible at all times. A good all-weather road is a minimum requirement if feed trucks and other traffic are to be accommodated throughout the year. Of course, feed and water must be available in sufficient quantity and quality to meet the requirements of the animals. Always check for zoning restrictions on a parcel of land you consider purchasing. Zoning regulations control land use. Check for restrictions on animals or on types of business that can be conducted at the proposed location.

Personal considerations are important. Some people would rather live near town than out in the country. Others may desire to have a location on a hill-top or with some other characteristic. By all means, try to satisfy your personal desires, but don't lose sight of the other considerations which have been mentioned.

You may already own a parcel of land that you plan to use for your horse farm. Before making a final decision, consider whether you would buy the same piece of land if you didn't already own it and use it for the horse farm. If it doesn't measure up in all ways, don't use it.

#### SITE SELECTION

The building site should be well drained and accessible. A slope of at least 5'/100' away from the buildings in all directions is desirable to assure good surface drainage. Topography affects the cost of site development. A nearly level site usually involves the least cost. Sites on slopes that require considerable cutting or filling are costly to develop and may make design compromises necessary for the buildings. Rock can compound the problem and increase the cost even further.

Avoid sites near streams that flood-stay well above the highest water level. Avoid areas with drainage problems unless the problem can be completely eliminated.

The site must be large enough to accommodate the planned buildings and other needed facilities. It should also provide areas for future expansion as well as for good traffic patterns for safe and convenient handling of animals, vehicles, equipment and materials. In snow areas, provide space for snow that is removed from work areas.

Water supply is a must. A mature horse will consume 8 to 12 gallons per day. You should have a water source capable of supplying the entire daily requirement in two to three hours. Additional water supply may be needed for fire protection. Check with your insurance agent for a recommendation.

Distracting noise, odors, heavy traffic, pollution and other nuisance factors may affect site selection. Consider the external nuisances that will affect your use of the site and the ones that your operation will create that might affect neighbors.

Existing buildings may be a factor in site selection. But, do not let them influence your decision unless their size, location, condition and arrangement fit into your overall plan.

Electric service is essential. Do not use a site unless electricity is available or can be provided at a reasonable cost.

## BARNS

Horse barns, whether large or small, should be well planned, durable and attractive. Its basic purpose is to provide an environment that protects the animals from temperature extremes, keeps them dry, eliminates drafts, provides winter and summer fresh air and protects animals and people from injury. There are many factors to consider and choices to make when designing a horse barn. You may want to develop your own plan, adapt a plan available from your state extension service or have a "custom" design produced by an engineer or architect. Whatever procedure you follow, make sure that the building will be what you want and need. Do not make the very common mistake of specifying a design or style that someone else has unless your operations are similar.

### STYLE

Barn styles are determined by the distinctive shape of the roof. The shed, gable and offset gable are mostly widely used. The gambrel, gothic and monitor roofs were popular in past years but are seldom used on new construction because of the higher cost of construction.

The shed roof is widely used on an open front and completely enclosed permanent free-standing facilities, as attached lean-to structures and as small moveable buildings. The single slope shed roof is the basic form for all sloped roofs. It is simple and easy to construct. Most shed roofs have a low slope. The manufacturers recommendations for minimum slope for the kind of roofing should be followed.

The gable roof is the most widely used roof structure for both open front and totally enclosed buildings. Either truss or single rafter construction can be employed. The ceiling may follow the roof line or be dropped to eave height. Overhead storage can be included. The offset gable is a special case of the gable roof which has two equally sloped surfaces of different length which meet at the ridge. The offset gable is commonly framed by using a truss with an attached shed roof extension on one side.

### CONSTRUCTION

Any construction method (i.e. masonry block, post and beam, stud wall, pole, etc.) can be used to construct horse barns. Pole construction is generally the most satisfactory. Pressure treated poles, either round or sawn are erected first. Then the remainder of the framing and the sheathing are applied. Wood trusses can be used to provide clear span construction as wide as 80 ft. for riding arenas. Wider spans usually involve steel construction.

A well constructed pole building can be expected to last 40 years or more. If care is used in construction, the appearance is equal to other types of structures.

### OUTSIDE SHEATHING

Roofs can be covered with aluminum, steel or some type of shingles. Aluminum and steel roofing is available in a variety of colors. Large sheets make the

roofing process go quickly. Sheets are available in widths up to 4 ft. and lengths up to 36 ft. Long lengths make it possible to cover the entire length of a roof slope on a normal horse building without making unnecessary joints. Fibreglass panels are available with the same corrugation pattern as the roofing to simplify installation of skylights.

Siding can be steel or aluminum sheets similar to roofing or wood. Metal siding can be applied vertically or horizontally, depending on the appearance desired. Plywood and manufactured (hardboard) sidings are available in a variety of textures and patterns. The large 4 ft. x 8 ft. sheets cover the sidewall quickly and also serve as wind bracing.

Metal siding is usually colored. Single colors or patterns of colors can be used to create a desired effect. Wood sidings need to be painted or stained for protection from weathering and for appearance. Use only lead free paint. Follow the suggestions in a good paint guide, available from a reputable paint dealer.

### LAYOUTS

When considering various layout options, consider both building function and engineering design. Function refers to the use of the building (i.e. breeding, riding, loose housing, hay storage, etc.). Engineering design refers to the factors that ensure the structure will be safe and functional.

There are four basic layouts for box stall barns.

- \* Single row of stalls with outside service area.
- \* Single row of stalls with protected service area.
- \* Two rows of stalls with center service area.
- \* Two rows of stalls with outside service area.

Of course, these basic layouts can be combined to make a variety of additional layouts. Building width depends on the layout chosen and the sizes of box stalls and alley ways. For example, a building with two rows of 12 ft. wide stalls and a 14 ft. covered center service area would have a total width of about 38 ft.

Layouts for other horse facilities are highly variable, depending on the building function. The important consideration is to have enough width and height for the activities associated with the structure.

- \* Alleys separating two rows of box stalls may range from 10 to 25 ft. Widths of 12 to 16 ft. are most common.
- \* Basic clear span structures 36 to 50 ft. wide can be used for exercising and training animals and as sales arenas.
- \* Basic clear span structures 50-100 ft. wide can be used for exercising, training and riding. Widths over 60 ft. are best for riding. A clear span of 110 ft. is recommended for an indoor show ring.
- \* Roofed, open front shelter structures, should be at least 32 ft. wide.

## BOX STALLS

For riding horses, the minimum size box stall is 10 ft. x 10 ft. The most common size is 12 ft. x 12 ft. although stalls as large as 16 ft. x 16 ft. can be found. If barn layout permits, at least one stall 16 ft. x 20 ft. is useful for foaling mares. An alternate arrangement that works well is to remove the partition between two adjacent stalls, thus making an area 12 ft. x 24 ft. available for foaling. Stalls for ponies can be smaller, depending on the breed.

Equip stalls with rugged Dutch doors or full length sliding doors. Horses can learn to operate doors, so provide door latches that the attendant can operate from inside and outside the stall and that the horse cannot open. A latch that requires two separate distinct movement works best. Sliding doors will also require a bottom mounted guide roller to maintain door alignment. Doors should be 4 ft. wide and 8 ft. high.

Provide a convenient and safe stall arrangement. Consider both the horse and the attendant. Include provision for watering; feeding hay, grain, and minerals; and for cross tying the animals. Built in hay-grain box combinations or individual hay racks and grain boxes can be used.

Automatic waterers are reliable and effective and are great labor savers. Their use is recommended in most cases. Locate waterers where spillage and overflow can drain out of the stall.

Box stalls can be made of wood masonry or metal. Both built in place or pre-built units can be used. Use 7 ft. or higher walls to prevent fighting by neighboring animals. The lower 4 1/2 to 5 ft. are usually solid. The upper part can be formed of steel bars, expanded metal mesh, chain link fencing, or vertical wood slats.

## FEED STORAGE

A feed room is generally about the size of a typical box stall. Organize it for convenience and easy housekeeping. Metal lined feed boxes or other metal containers will help to control vermin. Hopper bottom bins with auger unloaders are available that hold up to 20 tons. Their use is recommended for large systems to eliminate the labor involved in handling bagged feed. The bins are also filled by power equipment owned by the feed company.

The feed room should be well lighted and equipped with convenience outlets on each wall. The entrance door should be at least 4 ft. wide and equipped with a latch so that a stray horse cannot get at the feed. A concrete floor is also recommended.

Hay can be stored in a separate building, in an overhead loft or in a ground floor storage area in the horse barn. Overhead storage is traditional, but modern building practices do not leave much room for a loft. A separate hay storage building is frequently a good choice. Fire protection and cheaper construction are the two main advantages. It is usually a good idea to also provide limited hay storage at the barn for a two to ten day supply.

The major disadvantage to overhead lofts is that equipment is needed to move the hay into storage. Horse farms do not routinely have elevators and other handling equipment available. It is possible to contract to have the hay delivered

and stacked in the loft. It is likely, if a careful check is made, that a premium is being paid for the labor involved, which appears to be part of the cost of the hay.

Hay occupies about 200 cubic feet per ton. The amount of storage space needed depends on the total weight of animals, and how often the supply will be replenished.

### INSULATION AND VENTILATION

Insulation slows the rate of heat flow. Thus, an insulated building will be warmer in winter and cooler in summer than an equivalent structure without insulation. Insulation is recommended for the roof of all buildings. Rigid board material laid under the metal roofing. It may be desirable to insulate other parts of some structures. See your Extension Agent for advice.

Ventilation is the process of changing air in a structure. It helps to control temperature, moisture and odors while providing fresh breathable air for the animals. Provide a 2' x 2' window, guided by bars or wire mesh, in each stall. These can be opened for ventilation and will also admit light. The area over the plate and between rafters can also be left open. When these are combined with a ridge vent, adequate ventilation usually results. Forced (fan) ventilation can also be used, but the system should be designed by someone who is thoroughly familiar with the principles of air movement and the requirements of the animals. Do not attempt this by yourself. At best, you will probably waste a considerable amount of money. At worst, you can cause drafts and develop an unhealthy atmosphere for your animals.

Do not close up all of the openings in the building to keep it warm in the winter. Horses respire moisture. Water is also introduced into the atmosphere from spillage, clean up and urine. In a tightly enclosed building, this moisture builds up and causes condensation (sweating) on cold surfaces and produces a damp unhealthful atmosphere for the animals. Some air change must be allowed at all times.

### POLLUTION

Horse farms are generally not a pollution problem. However, the potential is present and manure must be handled in such a manner that water is not contaminated. In Virginia, water pollution prevention is the responsibility of the State Water Control Board. Other states have departments with other names but similar responsibilities. If you run a clean operation you are not likely to have a problem. But, if you carelessly allow manure or runoff from a manure storage foul surface water or ground water you can expect the regulatory people to be involved. They have the legal power to force you to close down your operation.

### OTHER FACTORS

Space does not permit a complete discussion of all aspects of facilities for horses. Other areas that must be considered include equipment storage, fences, specialty areas, etc. When you plan, consider all of these matters realistically. Get advice from a reliable source if you need it. Make your decisions on the basis of needs before wants. You will surely be more satisfied in the end.

## "Preparing a Mare for Breeding"

by

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### Introduction

Preparing a mare for breeding must begin long before the mare is led to the breeding barn or loaded into a trailer for a ride to the stud farm. Foaling mares, barren mares and maiden mares involve variable considerations and variable degrees of attention. The time and effort requirements per mare for an owner with two or three mares is going to be vastly different than for the breeding farm with forty to 200 mares. Therefore, it would be an oversimplification to try to outline a single procedure that would fit all needs and farms who seek advice on how to prepare their mare for breeding. We can, however, discuss some of the problems that lead to breeding difficulties and some of the solutions for those problems. Most mares fall into one of several categories in regard to their consideration as a mare to be bred and also in regard to their potential as a breeding mare.

The first category of mares we will consider is the foaling mares or wet mares. The subject of whether mares should be bred on foal heat of course is a controversial subject. Evidence would indicate that breeding mares at the first postpartum estrus do yield a greater rate of infertility as well as early embryonic loss than animals bred at subsequent heat periods. This problem is understandable in light of the fact that the uterus has not fully recovered from the previous pregnancy and that the uterine epithelium is not completely repaired by the onset of foal heat. California studies have indicated that 40% of the mares bred at foal heat were found to be pregnant and 33% foaled as compared to a conception rate of 51% in mares bred on the second heat post-foaling and 43% that foaled. With this apparent decreased fertility, the study also demonstrated, however, that the overall conception rate for the season was no lower in those mares bred initially on foal heat when compared to the overall seasonal conception rate of mares bred on subsequent heat periods! The advantages of breeding on foal heat are obvious to those of you who are attempting to deliver early foals. It is also obvious that the foal heat is a rather consistent period when a mare can be detected in estrus. In this regard, it is important to remember that although many mares show foal heat on the 9th day post-foaling, the range may extend from 4 to 16 days post-foaling.

In summary, I think it is safe to say that several criteria should be met to qualify a mare for foal heat breeding: a) the foal should be live, healthy and strong following delivery; b) the foal should be delivered without significant difficulty or assistance; c) the placenta should be passed within three hours postpartum; d) examination of the mare at 7 days postpartum should reveal no abnormal discharges and a cervix and vagina free of bruises and trauma; e) the uterus on rectal palpation should be involuting normally.

Although bacterial cultures of foaling mares are often made, our findings reveal that most cultures are positive but are probably only significant if the mare is showing other clinical signs which would lead to infertility.

A management procedure which we have used with reasonable success to allow more time for uterine involution and endometrial repair is to allow mares to ovulate at the foal heat, wait five days and then administer prostaglandins. Mares administered in such a manner usually return to heat within 3 to 6 days and ovulate about 4 days after coming into estrus. The fertility of this induced ovulation approaches that of subsequent ovulations. This procedure alleviates waiting until the second heat postpartum, provides about nine more days for uterine repair, and also provides the owner with a more consistent and predictable estrus for the anticipated breeding.

There are several considerations one should make in regard to foaling which will help ensure that the mare is prepared for breeding. A small percentage of mares have problems if allowed to foal on pasture and because of this, most mares in our area are brought into foaling stalls or small paddocks. If paddocks are used, they should be clean grass paddocks where close observation can be ensured. The majority of the mares in our area are foaled in stalls and straw is the most commonly used bedding. Tartan-like floors are sometimes used and the advantages are that they are easily cleaned and disinfected between mares. Sometimes mares are reluctant to lay down on Tartan, but eventually do and have been no major problem. The cleaner the foaling environment, whether it be a composition floor, straw, or a clean grass paddock, the less likelihood there is of having infectious agents gain entrance to a susceptible reproductive tract. It must be remembered that an infectious problem that is initiated at this time will probably not be manifested as a clinical problem until breeding time.

As the mare prepares for foaling, any sutures which have been placed in the vulva should be removed as torn sutures and vulvular lips are detrimental to the maintenance of a clean and healthy reproductive tract. Some guidelines to use during foaling are as follows:

a. If 3/4 to 1 hour has elapsed after the presentation of a water bag and the foal is not born, assistance is needed and you should call your veterinarian.

b. A foal should be born within 15 minutes after presentation of the feet. There is no need in most mares to pull on the foal if it is in a normal presentation.

c. If you can determine that the foal is in a malposition, you should call your veterinarian immediately.

d. Many mares will show some colic following foaling and it is due to normal involution of the uterus. This is a normal physiological process and should not be cause for alarm unless the signs persist.

The next category of mares are those individuals which have passed through one breeding season and have been accompanied by unsuccessful breeding attempts. When preparing these mares for the onset of the breeding season, several considerations should be made. Most owners are interested in taking advantage of the full breeding season and starting with the breeding procedure as early in the season as possible. If this is true in your situation, it becomes imperative that an evaluation of your mare be made prior to the onset of the breeding season. If abnormalities are found, they can oftentimes be corrected and alleviated prior to the breeding season and you have not lost valuable time. A rectal examination of a mare at this time will usually reveal the presence of uterine and ovarine pathology and a culture of the uterus should reveal the presence of uterine infection.

Once the breeding season has begun, the cyclic activity of the mare becomes very important. Without adequate records and a good teasing program, it is almost impossible to assess a mare's potential as a breeding candidate. Many workers have stated that the most common causes of infertility in the mare are irregularities of the estrus cycle. I believe this to be true--an assessment of the ovarian cycle is therefore mandatory in the preparation of your mare for breeding.

The influence of light on cyclic activity in the mare has been demonstrated and used in many parts of the world to initiate and renew ovarian activity. If lights are not used and the mares are in true anestrus (lack of cyclic activity), there is little one can do except to await the advancing season. If there appears to be irregular cyclic activity as judged by teasing, palpation of the ovaries is often helpful in determining the status of the mare. Depending upon the palpation findings, a decision must be made in regard to the mare's problem and the manner in which she should be managed.

The next category to be discussed will be referred to that of the maiden mare. The maiden mare is usually defined as a mare that has never been bred. Many maidens do not conceive during their first breeding season and the latter are erroneously called maiden mares again the following year. The preparation of a maiden mare for breeding can be subdivided into two categories. You may have a young mare used for pleasure and you are simply waiting for her to reach puberty to establish normal cyclic activity and to be bred. On the other hand, we may be dealing with an individual that is undergoing a major transition from an athlete to a brood mare, from race track to farm, from individual attention to group attention. The above mentioned transition surely must be a major psychological and physiological change.

In regard to the first category, there is considerable difference between mares as to when they reach puberty. In addition, their chronological age may not coincide well with their legal age. If a filly is sent to a breeding farm in the spring as a 3 year old, it may have been a late foal which means that it may only be a bit over 2½ years old when the breeding season starts on February 15th. There appear to be some fillies which are not sexually mature at this age. We will find an occasional filly which has a rather juvenile reproductive tract at this time and these individuals usually fail to conceive during their first breeding season. They may cycle regularly and

do everything right, but the ova are apparently not being released properly or the reproductive tract is not receiving the fertilized egg and conception is not being maintained. Assuming this type of mare is anatomically normal, the best procedure to exercise is that of patience.

The racing mare who goes into a brood mare band for the first time poses a new set of problems. Not too dissimilar is the pleasure horse which has been strenuously and consistently shown and fitted. The behavior of such a mare upon entering a brood mare band is often erratic. If this type of mare can be sent to the breeding farm several months before the breeding season starts, there seems to be less problem with adjustment. The type of medication or administrations a mare may have received during training or racing is usually unknown; however, I know of very few medications which enhance future breeding potential and I know of a considerable number which are detrimental to future breeding potential. Again, the most useful treatment during the "let-down" appears to be patience!

To prepare the maiden mare for breeding should involve a physical examination of the external genitalia. If the mare is new to you, you should ascertain whether or not she has been sutured and if she is sutured we believe she should be opened far enough to insert a speculum for a vaginal examination. The presence of a hymen can be determined and eliminated as a potential problem in breeding or foaling. The cervix should then be examined to see if it is patent and normal. Discharges and inflammations of the vagina and cervix can be determined and treated if necessary. If the mare is a true maiden, there appears to be little indication for culturing unless there is an obvious discharge or inflammation. Palpation of the reproductive tract will reveal abnormalities; however, a word of caution is in order. The finding of small inactive ovaries, a flaccid uterus and a cervix not well-defined should be of concern--however it is surprising how the reproductive tract can enlarge and change in a short time in an immature but growing mare.

The teasing program is just as important in preparing the maiden mare for breeding as with older mares, but may be very different. Many maiden mares are very timid or conversely very vicious in response to the teaser. On the other hand, many are just plain ignorant and unaware of what is going on. If after a month a maiden has not shown estrus, periodic palpation and speculum examination may be indicated.

Very limited experience indicates that prostaglandins may be somewhat less predictable in maiden mares than older mares in regulating cyclic activity. Other hormones are even less predictive.

In summary, I would like to emphasize that the difficulties in breeding often involve problems associated with foaling in the case of the aged mare and that these problems may not be apparent at the time of foaling, but will be manifested at a later time. In regard to the young mare, variability between breeds and between individuals and in the method in which they are handled prior to breeding greatly influences the results obtained at breeding. The preparation of a mare for breeding therefore relies more upon common sense and good management than on miracle drugs and heroic treatments. Much has been learned about the mare in recent years and there is much that can be done to aid the problem mare. Perhaps a better understanding is the best preparation we can make.

## PREVENTIVE MEDICINE

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In the past few years there has been an increasing interest shown by livestock producers in herd health programs. There has probably been more emphasis in the food producing species than there has in the pet animal groups. As far as horses are concerned the major breeding establishments have always had very extensive health programs, even though they may not have labeled them as such. Any health program, no matter what species, must be centered around preventive medicine. No matter what phase of the horse business you are in, whether it be breeding, sales, showing, or pleasure, the prevention of injuries or disease should be the primary purpose of any health program you have.

The horse has the largest heart size in relation to body weight of any of the animal species and is known as the "athlete" of the animal kingdom. In spite of their physical capabilities and stamina, horses are susceptible to many diseases and parasites just like man and other animals. They are also subject to injury, stress and all other ailments associated with animals.

Maintaining the health of the horse is essential to his optimum performance and physical well being. It also reduced the danger of the spread of diseases to other animals and in some cases to man.

It has been repeatedly demonstrated that the most effective and economical approach to the control of diseases and parasites is prevention. There are three fundamental principles that underlie preventive medicine.

1. Prevent animals from being exposed
2. Keep the resistance of the animals high
3. Induce immunity wherever available

### Prevent Exposure

1. Cleanliness and sanitation are essential to all disease and parasite prevention.
2. Quarantine all newly purchased animals 30-60 days before adding to any others. Release from quarantine only after veterinarian is satisfied diseases and parasites are not present.
3. Keep visitors out of stalls and paddocks. Make them use rubber footwear and wash in and out using soap and water as well as disinfectant.
4. Use utensils and equipment on your own horses only. Do not borrow or lend waterers, grooming equipment or barn equipment.

5. Keep horses away from public feeding and watering places.
6. House yearlings and weanlings separate from pregnant mares.
7. Do not overstock pastures.
8. Keep horses from wet and marshy areas.
9. Avoid contact with visibly sick horses either directly or indirectly.
10. As soon as symptoms are observed or suspected in a horse, separate him from other horses.
11. Avoid injury.

#### Keep Resistance High

1. Keep well fed. Do not over -- or underfeed --
  - a. Avoid contamination of feed.
  - b. Feed from bunkers or racks and not on ground.
2. Maintain surroundings and environment properly
  - a. Stalls should be large enough, with adequate ventilation and no drafts
  - b. Keep stalls, pastures and other facilities clean and sanitary
    1. Manure, trash and other extraneous material should be removed. Avoid nails sticking out.
  - c. Keep ample bedding in stalls
3. Keep horse well groomed
  - a. Reduce possibility of skin infections and external parasite infestations.
  - b. Prevents sores and galls.
  - c. Reduce areas where bacteria can survive.
4. Keep feet clean and well trimmed to avoid foot troubles such as thrush, grease heel, etc.
5. Cool out properly so as to avoid colds and colic.
6. Do not overwork. Condition horse for work.
7. Provide sufficient exercise and sunlight.

#### Induce Immunity Where Available

1. Routine immunizations
  - a. Immunize routinely against tetanus-toxoid and annual booster.
  - b. Immunize routinely each year against Equine Encephalomyelitis. Eastern and Western
2. Vaccines which may be used when indicated
  - a. Equine Influenza
  - b. Leptospirosis
  - c. Strangles or Distemper
  - d. Rhinopneumonitis

3. Over 60 immunizing agents sold; need some, do not need others.

Therefore, the primary purpose of a horse health program is the prevention of health problems. The type of program that suits one individual owner or farm may not be applicable or practical for another. The same thing applies from one area of the country to another. Also the type of operation and its primary purpose influences the health program. The best person to contact would be your local veterinarian. He would have knowledge of diseases that exist in your area and he is a vital part of a successful health program. Quite a few of the larger establishments have resident veterinarians, local practitioners on retainers, or they use practitioners who have specialized in equine medicine. Every horse owner, large or small, should have a "family" veterinarian.

I will make no attempt to give you a health program because it would be impossible to meet each of your needs for the reasons we noted before. I am going to discuss some general measures which apply in most instances.

## I. Management

This is an area which can be very important in a preventive health program. Such things as barn construction, stall size, type and care of fences, and general upkeep of the area where horses are kept should be considered. Damp, dark, and drafty barns cause many respiratory troubles in horses. Stalls that are too small or have protruding objects in them can result in many injuries. Fences in poor repair, no matter what type, almost always end up as the culprit in many of the bad, scar resulting injuries and wounds. A board on the top of a wire fence is a good investment. Continually clean up the area where the horses are in order to keep out pieces of boards with nails, old rusty equipment, etc.

Nutrition or feeding practices are involved in quite a few of the health problems. If you are mixing your own ration, instead of using a prepared commercial feed, consult with the Extension personnel at your agricultural college for help in making sure it is balanced. Some of the nutritional deficiencies are very vague and show up in unusual ways. Underfeeding, overfeeding, and feeding spoiled feed all can cause problems. Many cases of colic and founder are the result of feeding practices. Make sure the horse has access to fresh, clean water at all times.

Foot care is an important part of a preventive program. The old saying that any army travels on its stomach applies to the horse's foot - a bad foot results in no horse. Keep the feet clean and trimmed properly. Don't allow the animal to stand in a dirty damp stall - it may result in thrush or greasy heel.

## II. Parasites

The control of internal and external parasites is a big part of a horse health program. External parasites such as lice and mange mites cause a lot of the skin conditions in horses. If these parasites become a problem, be sure you do not spread them with brushes, combs, tack, and other equipment. All skin problems should be checked at once because the earlier treatment is started, the better the results.

The fact that there are 56 types of internal parasites that a horse may have and the fact there is no one medicine or chemical that is effective against them all makes routine fecal examinations very important. Not only will the fecal exam show the type of parasite present and, therefore, the treatment needed but it will help to determine the worming schedule necessary. Sanitary feeding practices, proper manure disposal, and pasture rotation are helpful measures to keep parasite levels down. The routine periodic worming for ascarids, strongyles, bots, and pinworms is necessary. The products to use and method of administration can vary. This should be discussed with your veterinarian.

### III. Immunizations or Vaccinations

#### A. Tetanus

Vaccinate all horses with tetanus toxoid. This is a 2-dose procedure with the doses at 4-8 week intervals. After the initial immunization they should receive an annual booster dose. Foals usually receive their first dose at 3 months of age. You should give brood mares their booster during late pregnancy. Foals may also receive antitoxin or toxoid at birth. Booster doses should be given after injuries or surgery.

#### B. Encephalomyelitis or Sleeping Sickness - Eastern and Western Type

All horses should be vaccinated annually at least 30 days before the times the disease usually occurs in your area, which is around the time mosquitoes become a problem. This is a 2-dose procedure with the 2nd dose 7-10 days after the 1st.

#### C. Strangles or Distemper

This is given annually with the initial immunization consisting of 3 weekly doses and then a booster dose once a year.

#### D. Influenza

Vaccination consists of 2 doses at 6-12 week intervals. Booster annually.

#### E. Viral Rhinopneumonitis of Contagious Abortion

Discuss with your veterinarian before starting a program of immunization. There are 2 types of vaccines available.

#### F. Leptospirosis

Not used routinely and only under direction of veterinarian.

### IV. Breeding Operation

All mares should have a health certificate before entering a breeding operation. The vaccination record and worming history should be known on all horses. All animals should have routine fecal examinations performed on them and blood counts if necessary. Reproductive tract examination should be

routine with all mares and cultures done if necessary. Periodic semen examinations should be done on stallions. All immunizations should be kept up to date. The strictest sanitary measures should be practiced during the breeding procedure. All safeguards that are possible should be used to protect the stallion, mare, and personnel involved.

## V. Foaling

This is the time when the results of a year's planning, work, and waiting is rewarded. One of the first things to remember is not to get in a hurry, have patience, and do not be too eager to help. Provide the mare with a large, dry, well lighted stall but don't necessarily keep all the lights on. If the mare has been sutured, be sure she has been opened up. The mare should have her tail wrapped and her rear quarters washed.

The normal presentation of the foal is front feet first, with heels down, and nose close behind. If there is anything different than this, call for competent professional help immediately. If the foal is coming normal, don't immediately grab the feet and pull, but be sure the nostrils are clear and then let it alone. After the foal arrives, allow the mare and foal to lie quietly. Do not break the umbilical cord. Watch to be sure the mare does not injure the foal when she first arises.

Apply iodine to the umbilical stump of the foal when the cord breaks. The foal should be up within 30 minutes and nursing in 1 hour. Be sure the foal nurses because the first milk or colostrum is very important. In some cases the foals are given tetanus antitoxin, antibiotics, and an enema in the first 24 hours.

The mare should clean or pass all of the placenta within 30 minutes to 1 hour. If she retains the placenta more than 8 hours, call your veterinarian because a retained placenta can cause serious troubles in a mare. Weigh the placenta and save it for your veterinarian to examine. It should weigh 21-14 pounds.

Give the mare a warm bran mash and some lukewarm water. Take about 7-10 days to get the mare on full feed. Examine the mammary glands several times a day for any swelling or unusual heat. Watch the mare for signs of colic.

Be sure the foal continues to nurse, have bowel movements, and is active and alert.

## VI. Miscellaneous

### 1. Teeth

An annual examination of your horse's teeth is an important part of a health program. The presence of caps, wolf teeth, points on molars, and abscess teeth are just a few of the conditions which can be found. If found at an early date, they can be taken care of and trouble prevented.

### 2. Records

A good record keeping system is important in any kind of a horse health

program. Every time something is done to or happens to an animal it should be put on the record. You should not attempt to trust all of this information to memory.

The question of what equipment and medicine you need to keep is frequently asked and is difficult to answer. Many factors such as type and kind of horse, the horseman's experience and his veterinarian, among others, influences the answer. What may be adequate for one would not be for another.

Following is a suggested list of items that would constitute a basic first aid kit:

1. thermometer
2. bandage scissors
3. mild disinfectant
4. white lotion
5. antiphlogistine powder
6. leg brace
7. liniment
8. healing powder and/or solution and/or ointment
9. eye medications
10. vaseline
11. bandages, cotton, gauze, tape, leg wraps
12. alcohol
13. iodine
14. a colic remedy and a cough medicine - only on your veterinarian's advice

Discuss these ideas with your veterinarian. There may be other things they would suggest based on their knowledge of your situation.

After having looked at some of the characteristics of healthy and sick horses and talked about a first aid kit, let's get down to some problems. To detect and "see" most of the characteristics discussed does not take a lot of expensive diagnostic equipment. These things can be detected by the use of the following equipment: your eyes, ears, nose, hands and mind.

Some of the common problems or ailments that affect horses will be discussed now. Hopefully, you will add to the printed material as we discuss these conditions. With all of these conditions, consult your veterinarian as soon as possible.

#### 1. Colic

- not a disease but is a sign of pain in the abdomen
- determine where the pain is and what is the cause
- remove access to feed and water
- keep animal from rolling and thrashing
- keep animal on his feet if possible, but if it wants to lie quietly, that is alright
- don't get horse exhausted by forced exercise, as this makes prognosis worse
- note frequency, amount and condition of feces and urine and presence of gas expulsion

2. Laminitis or Founder

- cause will dictate course of treatment
- keep feet cool
- keep "heart mechanism" of foot activated by limited exercise
- remove feed and water immediately
- remove shoes

3. Azoturia - Typing up

- keep animal warm
- do not exercise
- reduce feed
- induce urination

4. Colds, Shipping Fever, Strangles, Distemper

- keep animal warm, dry, out of damp and drafty quarters
- reduce feed, use a palatable laxative feed
- keep fluids available
- keep checking temperature and condition of lymph nodes
- reduce exercise

5. Grease Heel, Thrush

- both are a result of dirty environment, so clean up area
- trim hair around fetlock
- keep frog trimmed so foot can be cleaned properly
- routine use of agents such as Iodine-glycerine, Kopertox, Clorox

6. Punctures, Wounds (nail in foot)

- clean up area around puncture
- if foreign body is still present, pour disinfectant such as Iodine around it before removing and then in wound as it is removed
- bandage or cover area and keep dry
- tetanus immunization

7. Eye Lesions, Wounds, Injuries, Problems

- need professional help early for a diagnosis
- do not treat without consultation
- may use a mild eye wash such as boric acid

8. Choke

- animal will be coughing, profuse salivation, painful anxious expression
- keep your hand out of mouth
- remove feed and water
- try to determine cause
- gently massage neck region anteriorly or toward head

## 9. Lameness

- examine foot for punctures and/or foreign bodies - close examination is important
- palpate leg and joints carefully
- if fracture or severe tendon injury has occurred, use temporary splint and support and transport animal to barn
- application of cold therapy is indicated early, followed, possibly, by heat or alternate heat and cold
- be sure and get extra support on leg opposite the injured one

## 10. Wounds

- area and extent of wound will determine course of treatment
- keep wound clean and control bleeding by pressure bandage
- if wound is contaminated, wash with saline solution or tap water - do not use disinfectants
- consult veterinarian about possibility of suturing before applying medications
- keep check for excess granulation tissue
- tetanus immunization

## 11. Foaling Problems

- colic
- laminitis
- delivery problems
- retained placenta
- retained meconium or constipation
- naval cord

## SOME PRINCIPLES OF LAND USE

By J. Paxton Marshall\*

Each person uses land in many ways; some uses are direct and seen, others indirect and unseen. For example, every person uses land directly as territory; that is, there is a space that each person may occupy. The limits of the territory which each individual occupies are always determined by the immediate circumstances. Compare for instance the difference between being a resident of the city of Norfolk with being a resident of Craig County. As territory, land may be possessed and not owned. Possession implies a capacity to exclude other people; the excluded people either grant or accept the exclusion as a means of achieving justice, harmony, or security.

Indirect uses of land increase as an economy becomes more complex. Few indirect uses of land were made in an earlier era of family farms and subsistence agriculture. But a commercial agriculture and an urban society has changed that. For example, the electricity which illuminates homes and powers tools, equipment, and machinery is made available by a complex use of land. Moreover, few people would include the consumption of products made from petroleum or natural gas among their uses of land; but it is.

Land is physical space. The supply of this space is fixed. From this supply, people select those parts which can be used to satisfy human wants or to contribute to the production of economic goods. For example, some parts of the

physical supply of land may be selected for beauty and tranquility; others for minerals, forests, and farms. Each selected part has special natural attributes which provide desired services. The service may be a deposit of an exotic mineral such as uranium; or it may be high quality soils; or it may be unique terrain combined with a favorable rainfall distribution and frost-free temperatures. The sum of the parts that people select from the total of physical space become the economic supply of land. Because the services provided by this land may be devoted to alternative uses, people value the various parts differently. Thus, land is more than territory and space, it is also an economic concept defined by Raleigh Barlowe as "the sum total of the natural and man-made resources over which possession of the earth gives control."

### Land is Not Property

Because the services provided by land have value, people have developed a system of behavioral rules that are called property. Land is not a system of rules. Consequently, land is not a property. Land is a property object. A property object is a material thing. A parcel of land is a property object, and a deed or will are material things that symbolize the parcel and confer the interests that are property.

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The system of rules that confer property interests identify rights and duties with decisionmaking entities. Property rights in land specify the limits within which an individual may make and implement decisions about a parcel of land. The rights are granted to and held by individuals and are not granted to or held by things. Thus, people do not actually possess property rights; they possess rights in property. The function of rights in property is clearly stated by Gene Wunderlich, a USDA land economist, who has said: "In simplest terms, property separates those who do from those who do not have the right to benefit or decide." Thus, the primary function of property is resource allocation; namely, to distribute the rights to make decisions, to receive benefits, or to bear costs. For example, a person who has a parcel of land has the right to make a decision with respect to its alternative uses, but associated with that right is the duty to pay taxes levied on the parcel. Consequently, there is a necessity to distinguish between the parcel of land at issue and the system of rules that grant or deny an individual access to the privilege of exercising the rights and duties associated with the parcel.

#### Primary Classes of Property

Property may be separated into three primary classes: common property, private property, and public property. Common property rights are not exclusive to, and cannot be transferred among, individuals. Rights in land operated as common property are held equally, in common, by every person in a community. The community may be comprised of a few persons or of all the people of a state or nation. Rules that relate to common property are never in written form, but are applied by mutual agreement among the people who use the property. Because a right in common property extends the right to use it but fails to impose a

duty upon the users to maintain it, the quality of services provided by common property usually decline. This problem was described by Garrett Hardin in his classic article, "The Tragedy of the Commons." His example is elegantly simple. Take a pasture operated as common property that will support 100 head of sheep. Take ten herders, who each graze ten sheep on the pasture. A herder who adds one animal to his ten adds ten percent to his holdings, while extending to the commons an extra cost of only one percent. But when each herder adds the eleventh animal to his flock the pasture is overgrazed and the quality of its services decline for all the animals and all the herders. One response to this is to convert the commons to private property by dividing it into separate tracts. Another is to convert the commons to public property and enforce regulatory rules concerning its use.

Private rights in land increase the certainty people have that their decisions about the use of their land will be effective. This occurs primarily because private property rights are exclusive and may be transferred among individuals. Because numerous property rights exist in land, lawyers refer to owning land as owning a "bundle of rights," with each right a separate "stick" forming a part of the bundle. A parcel of land is owned in fee simple if the owner holds all the non-public property rights in the bundle. Because the various rights may be granted to others, say by leasing or the granting of specific easements, many people may actually hold an interest in the same land. Each person who holds a private-property interest in a parcel of land has authority to deny to all others the use of and the benefits which accrue from that interest.

Interests in land are much more complex today than when the nation was initially settled, at that time an owner of land held all the property rights except three--the right of escheat, the right of eminent domain, and the right of taxation. These were all the public property rights in land at that time. There are many more today.

Public property is regulated by explicit rules that are always written. Public property is always possessed and owned by some group of people. These people are always members of a community, usually a community with a formal governing body. This governing body may increase public property rights in land. An example is the comprehensive plan and its related implementing instruments--the zoning ordinance, the subdivision ordinance, and the site-plan ordinance. These public rights in land had their origin in the License Case decisions of 1847 when the Supreme Court recognized the police power and defined it as "the power of government inherent in every sovereignty . . . to govern men and things within the limits of its domain." The authority of local government to regulate land use by exercise of the police power through zoning was the central constitutional question raised in the famous Euclid vs. Ambler case decided by the Supreme Court in 1926. The Court held that states could delegate to localities the authority to regulate land use by zoning. This decision was important in laying the foundation for and justifying the development of a new land-use decisionmaking process--comprehensive planning.

### Planning and Policy

Planning is an accepted rational process for formulating objectives and standards that specify desired future conditions. Hence, planning serves to guide action. The process requires the collection of data to determine existing conditions and trends and to aid in developing and evaluating alternatives for their economic,

social, and political feasibility. When adequately carried out the planning process enables land-use conflicts to be determined and reconciled prior to the start of an action that may result in an inappropriate use of land.

The central question is, How to decide the appropriate use of land? This requires the establishment of a land-use policy. Policy is a course of action chosen from among alternatives, in light of given conditions, that serves as a guide for consistent and reasoned decisionmaking. Land-use policy is a course of action, followed through the political process, to reach specific goals which establish the use of land. If the selected course of action is to serve the general public adequately and effectively, it must be based on sound principles and long-term objectives.

An effective land-use policy should permit the long-run to be continuously considered. This is most effectively accomplished by asking and obtaining answers to a specific set of basic questions. Burl Long, a Virginia Tech resource economist, has developed a set of four basic questions. They are: What is to be done? For whom is it to be done? By whom, why, and when is it to be done? Should it be done at all?

### Apply the Basic Questions to an Issue

When agricultural commodities are in short supply, a widely expressed belief is that there should be a policy to preserve agricultural land. This is a statement of what is to be done. Assuming an affirmative answer to this question, then the question is, How much is to be done? This question demands criteria. For example, is the decision about "how much" to be a local- or state-level decision. Having decided the level, how is the amount and location of the

land to be preserved to be determined? These require decisions that establish criteria about the quality of land to be preserved.

Certainly, it is reasonable that the inherent agricultural production capability be a primary criterion in selecting which land would be preserved for agricultural use. For example, land with an inherent capability to produce, say, 100 bushels of corn per acre could take precedence over 50-bushels-per-acre land. But would the preservation of agricultural land center primarily on cropland or will natural pasture land also qualify for preservation as agricultural land.

As these questions are being resolved, answers must be provided to the question, By whom, why, and when will it be done? "By whom" involves a decision of where the land to be preserved lies and who will have their expectations about the use of their land changed? Furthermore, does the change in expectation impose a cost or confer a benefit upon the current owners, and if so, who will bear this socially imposed cost--the landowner or the public? The "why" involves assuring adequate land to provide ample food supplies to both present and future generations. This argument must be more than semantic it must be justified. This may not be an easy task. The "when" relates to the time period within which the institutional arrangement designed to accomplish the policy will have to operate to achieve it. Should this time frame be ten or fifty years or longer? Or, should the institution be designed to function at the time land is in an estate, the inter-generation transfer period when land is inherited. Of course, after all these questions are debated, an answer must be provided to the question, Should it be done at all? If the answer is affirmative, implementing the policy

to preserve agricultural land becomes another issue.

#### More Than Land-Use Policy at Issue

Many other land-use policy questions may be illustrated, but, in the final analysis, land-use policy will not necessarily be the primary policy. This is because land-use policy must be sufficiently flexible to accommodate the reasonable demands of certain other policies, especially growth policy, economic policy, and quality-of-life policy. These policies influence employment, income distribution, and, in turn, population settlement patterns.

Instituting land-use policies expected to result in a more uniform geographic distribution of growth, income, and population will take significant amounts of talent and skilled leadership. This is because the goals of different policies will conflict; hence, there must be tradeoffs determined through the political process. This process must not only accommodate the tradeoffs, it must provide for allocating the functions and responsibilities for implementing land-use policies to the appropriate decisionmaking entities--the individual, the community, the local government, the region, or the state. If the function and responsibilities are allocated so that competition arises among the decision-making entities, progress toward achieving the goals of land-use policy may not just be slowed; it may be stopped completely. Land-use policy must seek to find complementary uses of land and to develop a decisionmaking structure that reduces the competitive, sometimes antagonistic, nature of the current decisionmaking process to an orderly process.

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<sup>1</sup>Garrett Hardin, "The Tragedy of the Commons," Science Vol. 162, December 1968, pp. 1243-1248.

## Horse Mortality Insurance

C. Fred Kohler

Of all the products and services we buy, insurance stands close to the top as one of those items considered as a necessary evil. It provides no joy of ownership, only supplying a degree of peace of mind from economic loss, be it personal or for tax purposes.

With the advent of large capital investments in thoroughbred bloodstock, even the wealthiest find it prudent to buy insurance protection from time to time. It is hoped that this presentation will provide a better understanding of the horse insurance business and what it is offering you for your money.

First, let's examine the rating structure for mortality insurance. Most buyers regard the rates as quite high and may, accordingly, be deterred from buying. However, rates are governed by losses and from a high volume of underwriters an actuarial loss figure is developed for each classification of use of the thoroughbred. Theoretically this means that you get just as much for your money when you pay 7 3/4% to insure a race horse valued at \$10,000 as against insuring a broodmare for 4 1/2% when considered against the risk exposure of loss. To further demonstrate this, I have developed a little sale's pitch to those who resist buying horse insurance because they feel the rate is too high and, furthermore, they haven't lost a horse in ten years. My reply is, "Mr. Jones, do you insure your home?" If he like most of us he will answer, "Yes." I then say, "Mr. Jones, houses in most rural areas will carry less than a 1/2% annual fire rate. The annual fire rate for broodmares is 1%. From an actuarial standpoint, this simply means that losing your home to a fire and you pay twice as much for the protection which makes each policy equal in value to the others. However, live stock insurance is classified as a catastrophic form of coverage which means no salvage value. For instance, if your home catches fire, there is a reasonable chance of saving a part of it. But if your broodmare catches on fire, I doubt that you would be interested in any of the remains. Now, Mr. Jones, this establishes that the rate is not too high for horse insurance but merely that the individual must choose where he wishes to allocate his spendable insurance dollar. As horse insurance premiums are tax deductible and insurance on your home is not tax deductible, you can buy more horse value than home value for the same out of pocket expenditure."

"Now, as to your not having lost a horse in ten years, may I ask how many homes you have lost in the last ten years? If you haven't lost any homes, why do you insure your home and not your horse based on the objections you have so far given."

I have presented this little parable to illustrate that insurance should not be purchased based on rate alone but on rate as it pertains to loss exposure and that insurance absolutely should not be purchased on the basis of how many losses you expect to collect on over the years. If this is your primary interest, you are not the type of person insurance underwriters are anxious to cover. Insurance is not purchased for the expectation of profit through losses. The proper attitude is, "I hope I never

have a loss and my premiums are just a part of my overall operating expenses."

A loss ratio is a percentile figured by dividing the amount of premiums earned into the amount of claims paid. If you take in \$100 in premiums and pay out \$50 in claims, you would have a 50% loss ratio. Most of the companies figure they must stay at or below a 65% loss ratio to make a satisfactory return on their underwritings. To give you an idea of what is happening in the casualty insurance field, I quote from Business Week, January 26, 1976, as to 1975:

"Estimates of last year's total underwriting losses are shocking to most insurance executives.

A. M. Best Co., which tracks insurance industry results, early this month pegged 1975 underwriting losses in property - casualty insurance at nearly \$4.2 billion. According to Best, the industry suffered a 107.7% underwriting loss ratio - it paid out nearly \$108 in claims and expenses for every \$100 it earned in premiums. That is even worse than the loss ratios it experienced in the depth of the Depression."

Most of us have either made or heard gripes about the small print in insurance policies and I must admit, some policies are terribly ambiguous and confusing as to terms and conditions under which the policy is written. I have a personal distaste for health insurance policies written on humans. Never have I been able to correlate the hospital's charges made to me not covered by insurance and whenever I have written to the companies trying to clarify such situations, the answers leave me more confused than before corresponding with them.

However, the terms and conditions governing horse mortality insurance policies are straightforward and easily understood and whereas on the face of it most conditions seem to favor insurance companies, in reality, they provide benefits for the assured as well. Most of the conditions state procedures which must be followed by the assured in order not to invalidate a claim, should one be presented. All insurance policies are rated on a loss experience factor which has been developed for underwriting exposures protecting you, the assured. If the policy conditions governing and restricting the exposures were not present, then the underwriters would have to charge higher rates. Everyone feels the rates are high enough and I believe a large majority of the people purchasing mortality insurance would accept the conditions governing their policies in the knowledge that a higher rate would have to be charged if such conditions were not present.

Let's talk about valuation for a moment. Over valuation is a major concern of underwriters and all policies are written on an actual cash value basis rather than a stated face value amount. This means that in the event of a claim, underwriters can elect to indemnify the assured for less than the assured amount if it can be established that the insured amount is greater than the actual market value of the animal. In such cases, the difference in premium paid for the excess valuation would be refunded by the underwriters. This rarely occurs and, in fact, I have never encountered such a problem in twenty years of

writing this business. Most companies have personnel and agents who know the market very well and will work out an acceptable valuation with the client when the policy is written.

Did you ever wonder how underwriters are capable of placing five million dollars on one animal? People associated with the thoroughbred industry have become very blase about hundreds of thousands of dollars being paid for mares and millions of dollars for stud horses, and people outside of the industry probably think we are all nuts. Five million dollars is one hell of a lot of money to place on one individual. If this business were placed with me, I would, in turn, place it with my company. My company then goes through the process of what is known as "laying it off" which is exactly what bookies do in the gambling game. Make no mistake about it, the insurance industry is a gambling business. My company presently holds its reinsurance treaties with two domestic reinsurers. When values on individual animals exceed the capacity of our two domestic reinsurers, the excess amount is then presented to the Lloyds market. When presented to the Lloyds market it is given to one of the Lloyds syndicates writing this particular field of insurance. Each member of this particular Lloyds syndicate will agree to take a certain percentage of the remaining valuation to be placed. If this syndicate cannot absorb the remaining valuation, then the Lloyds syndicate manager will present the remaining amount to what is referred to as the "open floor of the Lloyds market" and other Lloyds syndicates writing in different fields of insurance will participate in varying amounts. The Royal Globe group is another English based insurance combine which has additional capacity should Lloyds of London be unable to handle the residue.

Let us now examine some of the conditions governing horse mortality insurance policies. Humane destruction is one of the most widely abused provisions and underwriters are necessarily conservative in their approach to procedures that must be adhered to. Under the policy provisions, horses may not be destroyed on the grounds that an injury disables them from performing the functions for which they are being kept. The humane factor is the only consideration. It is readily recognized that when a horse injures himself to the point that he is of no useful economic existence to the owner and this animal is insured for a considerable sum of money, the owner is inclined to press for destroying the animal more on the basis of economics than the humane basis. Often such owners may become upset with insurance companies for not permitting that a horse be destroyed. However, it really is not the insurance company's decision as to when a horse should or should not be destroyed, but rather the veterinarian's. The underwriters simply will not put a horse down unless an opinion is received from a qualified veterinarian that the horse is a case for humane destruction. If the owner's veterinarian dictates such action and the company believes that certain factors warrant additional consultation or exploration, then it has the privilege to appoint a second veterinarian to render an opinion. If the two veterinarians oppose each other in their opinions, then a third veterinarian, acceptable to both parties, would be asked to render an opinion, and the majority would rule. The owner must allow a reasonable time to see if an animal will respond to medical treatment.

The underwriters' permission must be obtained before an animal may be put down for humane purposes. The only time the company's permission is not required is if an animal is injured at a public function or on a public highway and a veterinarian in attendance deems it necessary to immediately destroy the animal to prevent inhumane suffering. Public functions would be horse shows, races conducted at a public track, etc. Unless a veterinarian is absolutely certain that the animal is a case for humane destruction, he would not put an animal down without the company's permission as this would constitute exposing himself to possible litigation in the future.

We will now discuss surgical operations on horses covered by mortality insurance. If an operation is performed to preserve the life of the animal, the underwriters will not charge an additional premium to cover such operation or require a reduction in value. When an operation is performed for corrective purposes, such as knee surgery, castration, etc., then the company may elect to cover such operations at an additional premium and require that the value be reduced by fifty percent. Not understanding their insurance contract, many owners become unhappy when advised of these procedures. Please remember, a horse mortality insurance contract covers and will indemnify the owner for loss by death of the animal and/or conditions dictating humane destruction. It does not contract to perform corrective operations or insure productive use of the animal. Therefore, the corrective operation is an additional exposure not originally contracted for and, indeed, the underwriters may elect not to even cover such operations. If an animal should fully recover from a corrective operation, then the value may be restored to its original amount.

We will now discuss rates for a moment. Each classification of use is rated differently by the mortality underwriters. The greatest spread of rates within any one classification is the racing classification in that cheaper horses are rated quite a bit higher than allowance and stake horses. The reason for this is that the racing exposure is considerably more with cheaper horses through the number of starts such horses make as against the stake horses. Once an animal reaches 12 years of age, the underwriters also will add over age charges for each year thereafter and at the same time require a reduction of value in such animals each year they are renewed.

Most of us recognize the two basic types of insurance, one being the full mortality coverage, and the more limited named peril policy, known as fire, lightning and transportation. Our company offers a third policy that is considered one of our standard coverages. This is called Special Accident insurance designed to bridge the gap of coverage between the named peril policy and full mortality. The rate is roughly one half the full mortality. This is offered on a selectivity of use basis and unless supporting business of other coverage is present in an individual's insurance program, we do not offer it on race horses valued under \$10,000 and not at all on steeplechasers.

The Accident policy has been very popular with owners of show and pleasure horses and thoroughbred foals and yearlings. We do not feel it provides adequate coverage for mares and stallions as it is our feeling that the more probable causes of

loss among these individuals are internal such as heart and intestinal complications. It is a good policy for those who want broader coverage than that provided by the named peril policy but whose budget will not permit the full mortality coverage.

Special Accident means loss from any and all sudden and/or violent means of death, including humane destruction. Examples of situations covered are injuries sustained from kicks, falling, fractures of all types resulting in death or deemed cases for humane destruction, all acts of God, such as fire, lightning, etc. and all transportation hazards.

May I call your attention to transportation coverages? In the standard Fire, Lightning and Transportation or named peril policy, the policy covers only loss from collision and/or overturn of the transporting vehicle. Losses not covered are injuries received while loading or unloading, van fits, or a sudden braking of the vehicle to avoid an accident, throwing the animal down with resultant injuries. Most people are unaware that these conditions are not covered in their Fire, Lightning and Transportation policies. So, if you want all risk accidental coverage, use the Special Accident policy.

There are other forms of insurance which we do not readily think about, these being guaranteeing a stallion's fertility, guaranteeing a mare will deliver a live foal, and guaranteeing that the mare will conceive and deliver a live foal. Fertility insurance for stallions has become quite popular with the advent of high price syndications. There is no simpler and easier way for an owner of such high priced stallions to make a guarantee to the syndicate that the horse will be serviceable as a breeding animal than through fertility insurance. The syndication agreement states that the animal will service a mare in the presence of three veterinarians who will judge his attitude and evaluate the semen report developed through microscopic examination. Once the veterinarians pass the animal as an acceptable breeder that should handle a normal book of mares, then the owner is off the hook as to his guarantee to the syndicate and all risk to the stallion's performance is then in the hands of the syndicate members.

In utero policies are proving very popular with purchasers of mares in foal to high priced stallions. Almost all breeding contracts state that the breeding fee is earned in full once the original owner breeding the mare has sold it. As the new owner considers a large portion of the value paid for such mare as being the foal in her, then he is interested in protecting such investment through in utero coverage. There are two basic conditions in in utero insurance that you must be aware of. One, the policy does not indemnify the owner if the mare should abort due to multiple births, and two, a fetus must always be in evidence for an autopsy report. If either of these conditions occur, the underwriters will refund the entire premium to the owner, considering that they were never on the coverage.

(Brief discussion on Loss of Use coverage).

I have covered a wide range of topics related to horse mortality insurance in this lecture and I am sure that you will recognize it as not being an in depth study on any one topic. However, it is hoped that the information presented will give you

a clearer understanding of what you are purchasing for your insurance dollar and, therefore, a happier experience from any issues that may present themselves.

If there are any questions, I will be happy to try to answer them, time permitting.

Thank you very much.

## LEGAL ASPECTS OF CRUELTY

by

Dr. Murray Loring  
Williamsburg, Virginia

As this speaker has traveled the state, both as a veterinarian and attorney, it is appalling to see and hear of cruelty to animals. In our modern economy, this topic should be eliminated and not be the realm of my talk. However, I cannot pass up this opportunity to stress this point. Cruelty is not only immoral and inhumane, but against the law. It is illegal.

The common law does not look upon animals as possessed of any rights. Cruelty to them is not punishable on the ground that it gives them pain. Such acts are indictable only when they work an injury to the owner of the animal by diminishing or destroying the value of his property, thus constituting a trespass or malicious mischief, or when so publicly performed as to constitute a public nuisance.

Statutory law, on the other hand, describes cruelty to animals as every act, omission or neglect whereby unjustifiable pain, suffering or death is caused or permitted. This may consist of overworking or under-feeding them, or of depriving them of proper protection, or all of these elements may combine and constitute the offense.

However, not every act that causes pain and suffering to animals is prohibited. Where the end or object in view is reasonable and adequate, the act resulting in pain is, in the sense of the statute, necessary or justifiable.

It is not cruelty to inflict pain or suffering on an animal where

the purpose to be attained is a good one, as the training of the animal or the saving of human life. A surgical operation, although it occasions suffering, may be justifiable. An operation which is necessary to make an animal useful to man, such as castration of a young colt or bull, is not considered as within the prohibition of statutes against cruelty. But where the act or operation does not benefit the animal for the use of man, and serves no lawful or proper purpose, it is cruelty.

Although the right of man to slaughter animals for his own use is undisputed, such animals must be slaughtered in as merciful a manner as possible. A method of killing them which involves unnecessary suffering is punishable as cruelty.

Poisoning an animal has been held to be an act within the statutes against cruelty.

Unnecessarily or cruelly beating an animal is punishable.

Cruelty may consist of overdriving a horse. This offense may be committed by cruel driving or cruel treatment. The act of riding a horse with an exposed ulcer which falls under the saddle blanket constitutes the crime of torturing and tormenting an animal. Likewise, one who had personal knowledge that a horse was suffering from open sores, but permitted that animal to be hired out anyway, with consequent torture, was guilty of a violation of statute relating to cruelty of animals.

In Illinois, a statute condemning the administration of drugs to race horses has been held to include within its scope the unlawful administering, or conspiracy to administer, to any race horse a drug, whether

stimulant or depressant, or to have in one's possession within the confines of the grounds described, the various prohibited drugs or instruments.

The evil motive of cruelty to animals need not be actual, however. If the act is of such a character as to show an abuse of proper regard for animal life or feelings, the intention will be presumed and the necessary motive supplied by construction. The unjustified shooting of a mule constituted the offense of cruelty to animals although the accused had no specific intent to torture.

The statutes against cruelty to animals apply equally to the owners and to other persons. When cruelty is charged, the ownership of the animal is immaterial. The owner or custodian is not liable for cruelty, active or passive, done or caused by his agents or servants, unless he knows and approves. He may be liable where the acts of cruelty are committed in his presence, as when an owner watches while cruelty is done by the trainer of his colt.

Not only are acts of commission regarded as cruelty, but acts of omission may make the owner or keeper of an equine liable. Neglecting to provide proper medical attention may be cause for indictment. In a northern state, an owner was found guilty of violating the cruelty to animals statute by omitting to provide proper medical attention for his horse.

A Missouri court ruled - "Evidence to support a conviction under the cruelty to animals statute for a unlawful failure to supply two horses and a number of ponies with sufficient food to prevent them from starving....

although it is the law that to render an act criminal or wrongful intent must exist, where a wrongful act is committed under such circumstances as were shown here, it might be inferred also that such acts were intentionally committed."

## BULK AND GROUP FEEDING SYSTEMS

by Earl R. Pitt  
Manager, Specialty Feed Services  
Southern States Cooperative, Inc.

Individual feeding of horses has long been recognized as the best management practice by many people feeding horses, however there is a growing interest throughout the industry in bulk horse feeds and group feeding of horses.

The primary reasons for interest in bulk feed and group feeding are (1.) time, (2.) labor, (3.) cost. Generally speaking, all three of these factors are realized by the feeder who purchases his feed in bulk rather than bags. Feed manufacturers can pass on the savings in bag cost, extra labor and handling that can amount to as much as \$10-\$12 per ton. The feeder, under most conditions, can save time and labor by feeding bulk feed since the time in opening, emptying and disposing of the bags has been eliminated. Also, if an outside bulk bin is used, this can enable the feeder to more efficiently utilize barn space and greatly reduce loss of feed due to rodents and insects.

The feeder must be using sufficient quantities of feed to purchase in minimums of three ton lots or larger before savings can be realized. You should be feeding enough horses to consume feed purchased within a 4-6 week period. Equipment needed to deliver bulk feed is more sophisticated and costly than for bag feed and a feed manufacturer generally can give you the best price on three ton lots or multiples thereof. Most feed stored over 6 weeks, depending on weather conditions, type bin used, can begin to be musty and dry and palatability decreases.

Like rations fed to horses, many of today's practices are desires of horse people rather than that of the horse. Many old wives tales and misconceptions remain with us in horse feeds and feeding. I feel pelleted horse rations are more desirable for a bulk program, although this is not mandatory. With pelleted rations, the feed generally flows out of the bin more readily and separation of the ration is eliminated - each bite is balanced. If textured feeds are used, not more than 40 lbs. of molasses per ton should be added to the outside of the feed and flaked or crimped grains should be utilized to reduce dust and increase flowability.

Metal bins are widely used, however wooden bins can be used. In any case, care should be taken to prevent build up of feed in corners where feed might mold. Bins should be thoroughly cleaned periodically to prevent this build up and check for any moisture leaks.

Pelleted feeds generally lend themselves best for a bulk program. These can be an all grain type ration or a grain and forage combination, depending on what you want to accomplish. Acceptance of all pelleted rations by horse people has increased greatly the past few years and from all indications, will continue to grow. However, in going from a textured ration to a pelleted ration, it is essential that horses be fed on a weight basis rather than volume.

Pelleted feeds are more dense. Needless to say, any change in a feeding program should be introduced gradually. Under some conditions, pellets will be consumed faster than textured rations and without proper management, digestive upsets can occur. If a grain-hay combination is used, it is well to continue to offer some hay to horses not on pasture and particularly to those horses that are stabled a big part of the time. Hay will serve to keep the digestive system in good loose condition and in many cases, prevents wood chewing caused by boredom. Pellets are generally offered in sizes ranging from 11/64 inch up to 1/2 inch in diameter. This is a matter of choice by the feeder. Some feeders feel horses are more prone to choke on the larger pellets, however this has not been my experience. The all grain pellets with which I have had experience is generally offered in a small (11/64 inch) pellet while the grain-forage pellet is 1/2 inch in diameter. Horses generally chew the larger pellet more slowly rather than bolting it. Many horsemen in the Lexington, Kentucky area are successfully feeding a 1/2 inch all grain pelleted ration to foals, weanlings, yearlings and broodmares. They report that foals begin eating at 2-5 days of age, chewing the pellets thoroughly with no problems. The larger pellet can also be fed on the ground or on ice and snow with little or no loss.

Pelleted rations can also utilize some very good feed ingredients such as wheat middlings and corn gluten feed that are not palatable in the meal form. This can offer additional savings over whole grains during some times of the year. Another advantage of pelleted feeds is it prevents the horse from picking out certain portions of the ration and leaving other portions. Each bite is a balanced ration. This can be especially important if you are creep feeding foals or feeding horses for maximum intake and they have a tendency to be picky.

Group feeding is a practice that is becoming more acceptable to horsemen. Labor can be saved in feeding, cleaning stalls and some horsemen feel their horses do better when subjected to group conditions. Horses get more exercise and develop a natural competitive spirit that is valuable in racing and other competitive events. Group feeding requires better management than individual feeding. Horses should be separated according to age and sex and should be observed very closely. Some animals may not adopt to group feeding and may have to be pulled out and individually fed.

Group feeding can and should start with the foals by creep feeding. Since mares vary in their ability to provide milk, the foals should have access to a creep feeder by two weeks of age if they are to grow to their genetic potential. Foals need to eat small amounts of grain several times a day for optimum growth and this cannot be accomplished by feeding the foal with the mare. The mare will not share enough if fed from the same box, and the foal needs to eat more often than the mare is fed. Over eating by foals on a creep feeder is seldom a problem if foals are started before two weeks of age.

After weaning, foals should be segregated by sex and can continue to be group fed. Adequate feeding space should be provided. Plenty of room is necessary so foals can move away from each other. Large pastures should be used if at all possible to provide maximum room and exercise.

Colts can be developed in this type of feeding arrangement until they are ready to be broken to the saddle or harness. At that time, they are generally brought in and individually fed.

Mares can be handled in groups after the foals are weaned up to a few weeks before expected foaling time. Since the nutritional requirements of the gestating mare increase quite rapidly during the last 60 days of gestation, they are generally brought in at this time and individually fed. Care should be taken in introducing new mares to a group situation. A social order is established and it may take several days or weeks before the new mare is accepted and takes her place in this social order, especially at feeding time.

Group feeding of horses can save time, labor and cost if handled properly. The perceptive horse manager will be aware of the social behavior of the horse and implement management practices designed to offset any adverse effects they might have. Some of these problems are:

1. Group horses by age and sex where possible.
2. Space feeders well apart. Use individual feeders where possible and always provide one to two extra feeders than the number of horses being fed.
3. Feed at the same time each day. Horses are creatures of habit and will utilize their feed stuffs best on a regular schedule.
4. Always be cautious and observe horses for aggression when changing groups.
5. Keep feeders clean.
6. Provide fresh feed free of mold and dusty ingredients.
7. Allow horses free access to a loose mineral mix containing an optimum calcium to phosphorus ratio of 2:1. The mineral mix should be complete, including trace minerals and salt.
8. The broodmares nutritional needs are related to the stages of her reproductive cycle and her feed, in quantity and quality should be adjusted accordingly.
9. Protein quality is important for optimum growth and development of young foals and should be provided for in the creep ration.
10. The eye of the feeder is the most important aspect of feeding horses.

(Slides will be used to demonstrate several group feeding programs used in the area.)

HORSES AS SEEN IN 1966 IN ASIA AND EUROPE

by  
CHARLES W. SELDEN, JR.  
RICHMOND, VIRGINIA

This is a brief description of what I saw in seven countries of the old world.

September 27, 1966

Left Richmond to go to New York to meet the group of eighty-five on a People to People Horseman's Trip.

September 28, 1966

Met group at Kennedy Airport for supper and briefing before boarding TWA Flight 708 on a 707 with above 120 people at 9:20 P.M. The flight took off at 10:10 P.M. and we flew at 33,000 feet arriving London at 4:30 A.M. Eastern Daylight Time.

September 29, 1966

Stayed in London Airport until we left at 1 P.M. arriving in Moscow at seven p.m. aboard a Russian plane. Time difference - five hours New York and London and two hours London and Moscow.

September 30, 1966

Tour of part of Moscow and the Kremlin grounds and wall from both outside and inside. Arrived at the School of the Museum of the Horse where there are 40,000 art paintings of horses. The students are taught horse formations from these paintings. Later in the afternoon we went to the USSR fair which is a permanent paneramma of what there is in all sections of the USSR. The horse exhibits were disappointing although there were two or three racing horses and trotting horses.

October 1, 1966

Left Moscow on plane for Pyatzgorsk which is in Caucasons between the Black Sea and Caspian Sea. It is noted for its healing springs. During World War II it was 90% destroyed but has been rebuilt. We were entertained at the International Club for students who are studying the English language.

October 2, 1966.

Went out to the stud farm. The country is wide open, no fences and 35,000 acres. The broodmares and colts run together with a man on horseback to supervise them. Each herd has its own herdsman who is on duty for twenty hours at a time. The stallions are kept in the stud barn in large stalls. They were large animals having been crossbred in an effort to build more stamina in the animal, particularly the legs and ankles. These stallions, we were told, had been crossed from mares and stallions of other countries. It appeared to us that many had bad throat defects affecting the glands. Their farms are knows as collective farms.

October 3, 1966

We learned the farms of 35,000 acres have on them between 6000 and 7000 people. This farm was mainly a cattle farm which has large cows for milk as well as for food. The principal crops were wheat, barley, oats, alfalfa, sudan grass, soy beans, peas, two kinds of beets, sunflowers, which are used for oil. On the farm are 600 horses, 175 tractors, combines and other farm machinery. All breeding is done by artificial insemination. One of the bulls brought out weighed about 1600 lbs. Flew back to Moscow from Pyatzgorsk.

October 4, 1966

On from Moscow to Prague on rough flight. The Russian flights seem to go almost straight up and down. The hay we have seen is in large stacks high and long and narrow. The silage was in trenches buried with dirt on top and what could be seen was green and in good shape. Beets are also buried or stacked along the railroad for loading in box cars, the stacks are as large as a box car. From Prague we went to Budapest. In Budapest we found the Academy of Agriculture very interesting with its many items and much history.

The race track with its green grass and many flowers was beautiful. There are three tracks, a 1000 on straight away, a regular flat track and a steeple chase track. The grounds are not lighted, therefore, all races are run in the daytime. All horses shown were 17 hands high and crosses of American, Italian, and English horses. From here we went to the trotting track where we saw horses of the same type.

October 5, 1966

At the Hungarian breeding farm we saw they had bred halfbreds to a sturdier stock than had the Russians. In Buda, part of Budapest, there were buildings dating back to 1200 AD and pointed walls 500 to 600 years old with colors that have not been able to be reproduced. The farms in Hungary are cooperative farms, where in Russia they are collective farms. The barns are old, good and substantially built. We have seen all types of wagons, some with rigid tongues, so that at times they only need to use one horse.

The flies at some of the barns were very numerous, and there was evidence of the hot fly with many animals showing signs of worms and weaknesses in the pure bred.

October 6, 1966

In Vienna we were invited by Alies Podhaisky, the head of the Spanish Riding School, to be his guests. We were shown to seats on the lower level of the riding academy and saw a beautiful building and a wonderful training session. It was done quietly, mostly with control. No pictures are allowed to be taken in the hall. The old stable is in very good shape, kept clean. The Lipizzaners colts are born coal black and about the third year they start to turn white and by the time they are six they are all white. From here we went to Salzburg by train down through the valley between the mountains. All fields were well cultivated.

October 7, 1966

Out of Salzburg, Austria we visited several farms. The Nordic horse is to me a heavy type work horse about 15-1/2 hands high with large broad chests, thick legs, and strong. Here we saw what looked like to us some appaloosa types. The cows here were for both beef and milk. This farm had about 6800 acres and it was the place where the Sound of Music was filmed.

The Hofemier horses which were slighter built were being shown. Flew from Salzburg to Frankfurt in order to get proper flight to Paris.

October 8, 1966

From Paris by bus to a place beyond Nevers where the Charolais cattle breed originated. The cattle seen were large with the bull weighing about 1800 lbs. and calf at birth weighing about 90 lbs. The barn here was built in 14th century with the moat around it. It is said that Joan of Arc stayed here. Due to dampness the pasture was lush with a heavy growth of rye and clover.

October 9, 1966

At the race track we found rebuilt stands with escalators, and color TV showing the race as well as the betting odds. The tracks are all heavy turf and horses run a clockwise direction completely opposite to our races. It was the Arc de Triumph race, similar to our Kentucky Derby, with twenty-four horses running.

October 10, 1966

We left early to see the training farms at Chantilly. At this facility they train 2400 horses a year. The training tracks, woods areas and paths were beautiful. One of the woods roads is covered with sand and 1000 meters in length. The combination wood roads, training tracks are alternated in horse training to keep the horse from going sour. Most of the barns were new and nice with cement floors on which is spread a heavy layer of straw.

Later we went to Grosbois where they have converted an old castle area in a club for training trotters. Napoleon is said to have lived here. Many of the items there date back to the 14th century with some to the 18th century. The new buildings of 30 stalls each with living quarters for the crew were being built like the old style buildings following the many great traditions. Since the atmospheric conditions are damp the pastures are lush with English rye. The tracks here were dirt.

October 11, 1966

At Hanover, Germany we were shown many types of the Hanoverian horse, which is a heavier horse than the English. It is a good jumper, rider and show horse. We saw five different styles and about ten of each style. The Kaisers coach has been preserved and it was shown with four big black horses pulling it. The driver and coachman were in full regalia adding to the already beautiful sight. Near here is an Agricultural Experiment Station for cattle with some of the bulls weighing as much as 2600 lbs., being very large and looking like a large Holstein.

At the next place a private farm we saw Hanoverian Horses, black and white cattle, land race hogs, long, tall and lean.

October 12, 1966

In West Berlin a new rebuilt city. At 5 p.m. we went to the harness races on a cold, misty, foggy bad night. The harness races were very uninteresting with no starting gate, they start according to handicaps and when the race is over they do not return to the winners circle for there is none, they simply go on back to the barn.

October 13, 1966

Visited East Berlin for first and last time. No thank you. Flew from Berlin to London and then to Dublin, Ireland. All afternoon was required for the trip.

October 14, 1966

Visited stud farm at Kildare where we saw horses not as large or as heavy built as those on the continent. The places are beautiful with Japanese garden taking man from infancy to death. These horses were of the finer of lighter build. The stalls were kept clean and most have concrete floors sloped and grooved or channeled for drainage with heavy straw bedding. It was brought out that they use a stallion for only forty-two mares and the breeding season is from January to June.

In Ireland they seem to raise sheep, cattle, hogs and horses. No corn or large grain crops due to weather conditions, which do not let them cure. Hay is hard to handle and cure. Grains are an import. Grass silage is put in bunkers and covered with plastic.

October 15, 1966

Dublin, Ireland. This morning we visited Stud Farm of Ambassador Raymond Guest to Ireland from the United States. The barn was of block walls, cement floors and with groves in the sides of the walls horizontally to allow the horse to get foot hold if it has rolled over on its back too close to the stall. The number of studs was few, but they were in excellent condition of lighter stock than the French studs, but heavier than most American studs. The brood mares were in a field together with the 18 year old grey mare as the herd leader. There were several different types and the excitement of so many people had them running about a great deal.

From Mr. Guest's farm we headed for a race track, where we saw flat races, hurdles and steeple chases. The first race had a spill with a hurt jockey. The second race had two spills, two hurt jockeys and a horse had to be destroyed. The rest of the races were good with several photo finishes.

October 16, 1966

Day spent leaving Dublin flying to London, where it took from 7 am to 2 pm. After 3 pm went on sight seeing trip of London and returned to the Piccadilly Hotel on Piccadilly Square.

October 17, 1966

This day was a sight seeing trip in the country, stopping for lunch at a castle built about 1100 with four foot thick walls.

October 18, 1966

This morning we left for a visit to the horse farms in New Market area which has been a racing and training area since the year 1060 and before. There are 2000 horses on 3000 acres in many barns. The cost in 1966 per horse for the use of the facilities and land was \$75.00. No horse has been or is exercised over the same area each day or any day of the year. We visited the race track but there were no races scheduled. The horses were exercised in open fields, heavy wood land or woods roads as well as on tracks. At one time we counted 75 horses in 5 training groups. One of the trainers we met had been a trainer since 1911 and had over 2000 winners. A stable boy or girl had charge of two horses and was paid \$75.00 per week. They had full responsibility for feeding, grooming, exercising, cleaning their stalls and does all for the horse. The town of New Market is supported by the horse industry as 60% of the people are directly employed by the horse people.

On the way back we stopped by the Tattersalls sales barn where all of the big sales are held. There are new facilities seating between 800 and 900 people and spaces reserved for bidders.

October 19, 1966

London to New York

Due to weather conditions flight planned for northern route from London over Newfoundland, Montreal and into New York. Further bad weather changed plans and we landed in Halifax, Nova Scotia for gas and a waiting spell for the weather to clear before landing in New York.

## TRAIL DEVELOPMENT

by  
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Introduction. Trail riding is becoming one of the fastest growing horse activities across the country. This outdoor sports activity is good and enjoyable for riders of all ages and for horses and ponies. Trail riding utilizes the horse the best for which he is intended and designed - moving across ground and going someplace. With the present and projected future interest in trail riding, it is imperative that the horse industry devote more time and planned effort to trail development, maintenance and expansion.

Kind of Rides. Trail riding takes many forms. The basic and most important is the individual or small group ride on a regular basis. This kind of ride requires two to up to twenty-five miles and should be accessible to the rider without hauling so that he can start at and return to his own home or stable by horseback. This allows for more use at a lower cost and presents the number one challenge to the industry to provide these kinds of riding opportunities for future generations. This type of trail should be designed for all urban areas, housing developments and rural areas. A set of trails around urban developments has great impact on property values and life style over a long period of time.

Distance riding may take the form of a pleasure ride, competitive ride or endurance ride. These rides require trails from around twenty-five to one hundred miles. Other large mileage or area rides include hunts, back country trips, wagon trains, large group rides, packing and camping trips, etc. The possibilities for trail riding are unlimited.

Trails. A trail is a place to ride to go from one place to another. There is nothing mystic about a trail. Trails may include fields, easements, right-of-ways, abandoned roads, property lines, limited access roads, etc. Trails in wooded areas do not have to be "paved highways" built at great expense. A simple marking and limited clipping so the rider can reach up and out is sufficient. Trails may be designed by zig-zag design to allow for maximum mileage. In some cases multiple use may be included but generally a horse trail should be designed for and limited to horses. Numerous government supported programs have established trails for hikers and other groups - the horse industry should continue to do the same and also to assume more responsibility on its own for trail development. For example, trails in parks may be built to parallel existing footpath trails. Urban areas will need to include easements, overpasses or underpasses to cross highways and this can be expensive but can be done. Whenever possible, trails should include the crossing and viewing of the natural beauty of the area. Streams and many rivers can be forded and expensive bridges are not necessary. Horse trails on public lands certainly do not have to be that expensive to develop and local groups can do most of the work. Designs should plan for good land use, scenic value to all citizens and prevention of erosion or damage to the vegetation and environment.

Industry Action. Most of the trail development program can be best done by local saddle groups to work with the responsible agencies to develop and maintain trails. At the area or state level, trail riding associations and horse councils can have input for larger projects, especially with state and federal parks. At the national level, many trail riding associations and the American Horse Council have been very effective but we all still have a long way to go. Organization, education and action programs at all levels are the keys to success. The industry must be organized to plan programs and to anticipate rather than to react violently to change. Local groups can then take on projects in good taste, well planned and properly conducted.

#### Some Specific Action Programs.

1. Local groups to ask local governments and planning districts and commissions to include plans for short and long term program development for the horse - trails, facilities, access areas, etc. If the planning commissions do not include, it will never be there!
2. Conduct local educational and awareness programs for the horse industry.
3. Get horse people involved in land-use planning.
4. Include horse farms as agricultural units in land-use programs.
5. Involve horse people when questions of ordinances and zoning arise.
6. Local groups to work with federal and state parks to develop access areas and trails.
7. State and national groups to work with federal and state parks to develop access areas and trails. Access areas and facilities at this level are just as important as the trail itself.
8. Conduct educational programs with urban planners and public housing developers to include master plans for the horse and trail riding.
9. State and federal parks to publish guides and maps for all trails available.

#### Some Goals.

1. All urban areas to have trails and access to trails.
2. Housing projects to include easements, access areas, facilities (show and stabling) and trails.
3. All parks, federal and state, to expand facilities, access areas, and trails.
4. Each state to develop two or more complete across state trails.
5. To preserve our hunts and develop new hunt areas.
6. Land-use policies to be favorable to Agriculture including horses.
7. Horse owners to be protected from unfair zoning, ordinances and taxes.
8. Several long trails to be developed crossing several states such as the Appalachian trail now in use by hikers.

#### Other Items.

1. Horsemen have a responsibility in return to preserve trails, keep trails clean, properly use facilities and use good management and sanitation for facilities (public and private).
2. Local saddle clubs may have parks set aside areas and the club develop and maintain trails on a local use basis.
3. Local groups may have old abandoned roads or limited use roads, right-of-ways, etc. designated and marked "Horse Trail".
4. Groups may ask parks to plan for and project access areas. This is a critical issue.
5. Now, rural groups may say "so what". We have a lot of riding areas. Whoa! This may be the most endangered area. As more urbanization and small acreage homesites are developed the access and area will be reduced. Rural areas need long range plans, deeded access areas, rural roads designated horse trails, private land owner consent, deeded trail areas, etc. for the future.



