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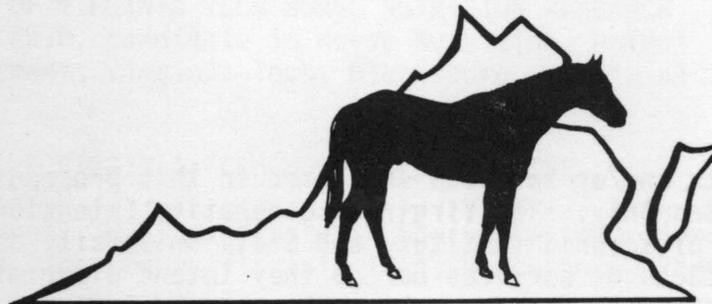
VIRGINIA HORSE CONVENTION

March 19-21

Va. Tech

Blacksburg, Virginia

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The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author details the various methods used to collect and analyze the data. This includes both manual and automated processes. The goal is to ensure that the information gathered is both reliable and comprehensive.

The third part of the report focuses on the results of the analysis. It shows a clear upward trend in the data over the period studied. This indicates that the implemented measures have had a positive impact on the overall performance.

Finally, the document concludes with a series of recommendations for future work. It suggests that further research should be conducted to explore additional ways to optimize the process. The author also notes that regular updates to the system will be necessary to keep it effective.

FESCUE PROBLEMS

by
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The Plant

Tall fescue (Festuca arundinacea, Schreb.) is one of the most important grasses in the United States. It is an aggressive, long-lived, widely adapted grass that forms the basis of many pasture programs in Virginia. This deep rooted, perennial grass forms a bunch type growth but due to spreading by its short underground rhizomes, it will, in time, form a dense sod. The sod-forming characteristic makes it an excellent choice for erosion control. It is well suited to steep slopes, sod waterways and areas subject to heavy traffic by both animals and machines.

Tall fescue is grown over a wide range of climatic (rainfall and temperature) and edaphic (soil texture and moisture) factors. It makes its best growth under relatively cool growing conditions with good moist soils that are heavy to medium in texture. It does not persist well on deep sandy soils. It will survive both hot summers and cold winters. Supplying ample soil moisture will increase growth and stand persistence under conditions of high temperature stress. It is, however, one of the most drought tolerant of the grasses adapted to Virginia. Fescue is also very tolerant of wet soils. It is an excellent choice for poorly drained areas and can stand partial submersion for short periods of time.

Kentucky 31 tall fescue was found growing in Menifee County, Kentucky before 1890. The grass was collected by E. N. Fergus, Professor of Agronomy, University of Kentucky in 1931 and was evaluated and released by the University of Kentucky as a variety of tall fescue in 1943. Although many varieties have been developed and tested since then, Kentucky 31 continues to be the primary recommended variety. Hybrids between tall fescue and annual (Lolium multiflorum Lam.) or perennial ryegrass (Lolium perenne L.) have also been developed. Kenhy, developed from a cross between tall fescue and annual ryegrass, was selected for high moisture content of leaves, soft leaf texture, and improved forage quality.

The Problems

Abnormalities of reproduction in mares grazing fescue pastures have been repeatedly reported by horse breeders and veterinarians. The most commonly reported problem isagalactia. The foal is born alive but dies soon after because of the mares failure to lactate. Another major problem is abortion of foals. Pregnancy appears normal until the last trimester with abortion occurring near term. A third problem in mares is prolonged gestation with gestation periods of up to 13 or 14 months. The resulting foal may be too large for normal birth to occur resulting in the death of the mare, foal or both or severe injury to the mare. Abnormally thick, tough placentas have also been observed. Foals may be born alive but are unable to break through the fetal membranes and die from suffocation.

In a survey conducted in Missouri, it was shown that mares grazing fescue had a much higher frequency of these problems than mares grazing fescue plus other types of grasses or mares grazing entirely on other types of grasses. This study further showed that feeding grain while mares grazed fescue did not prevent the problems but feeding alfalfa hay did decrease the incidence of problems.

Based on limited research in Missouri, it appears that selenium may be a factor involved in the etiology of the fescue problem. Missouri researchers found that mares supplemented with selenium had no reproduction abnormalities while 50% of mares not supplemented exhibited agalactia and/or suffocation of foals. Because of the small numbers of animals in this study, however, the evidence is not conclusive at this time.

Tall fescue has also been related to a number of disorders in cattle. Symptoms associated with fescue toxicity have been described as reduced rate of gain, reduced milk production, rough hair coat, elevated temperatures, soreness and lameness in one or more feet, dry gangrene in the extremities (legs, tail and ears) and fat necrosis. Terms usually associated with fescue problems are fescue foot, fat necrosis, summer syndrome, or simply poor animal performance. It is not at this point known whether or not these are different manifestations of the same causative agent(s) or whether they are separate disorders.

Fescue foot is characterized by lameness, usually in the hind limbs and a lack of circulation to the extremities with loss of hooves, tail or ears in extreme cases. It occurs principally in the winter time and may be associated with poor soil drainage. Early clinical signs are loss of weight, rough hair coat, an arched back and scouring. A characteristic line may form at the coronary band of the hind foot. Symptoms occurring in the summer time are usually referred to as "summer syndrome." Animals exhibit a desire to reduce body heat by standing in water, lying in mud and remaining for prolonged periods in the shade when animals on other pastures would be grazing. Rough, dirty hair coats, elevated temperatures, rapid breathing and poor condition are typical symptoms. Fat necrosis is associated with physiological disfunctions resulting from necrotic or hard fat lesions.

Palatability and intake of tall fescue are often noted to be low. Weaning weights of calves have been shown to be lower in calves grazing tall fescue pastures when compared to either nitrogen fertilized orchardgrass or grass-legume combinations. Reproductive performance of cattle on fescue pastures has also been shown to be impaired. Lower conception rates are often noted.

Factors which affect fescue quality include age of the leaves, fertility of the soil, season of the year and genetic variations within varieties. Quality is usually improved by keeping the plants grazed or clipped to prevent accumulation of old leaves. Digestibility and palatability are lowest in the summer, intermediate in the spring growth and highest in fall accumulated growth. Increased quality of fall growth is associated with an increase in soluble carbohydrates while crude fiber and lignin remain about the same. Poor animal performance may be related to the alkaloid content. At least nine alkaloids have been identified in tall fescue.

The Potential

Tall fescue affords grazing over much of the year and is characterized by having a high carrying capacity per unit of land area. Quality, as measured in the laboratory, is high but animal performance is variable. Fescue furnishes an abundance of growth in the spring which, if kept in a leafy vegetative stage of growth, is relatively high in quality. It is able to meet the nutritional needs for maintenance of most animals.

Summer production and quality are lower as compared to both spring and fall growth. Including legumes in tall fescue pastures will increase total pasture production, forage quality and animal performance. Weaning weights and conception rates are improved in both horses and cattle.

Stockpiled fescue forage, accumulated during the fall for late fall and winter grazing, is high in soluble carbohydrates and digestibility. It affords an abundance of high quality grazing. It is more economical to provide this grazing rather than feeding harvested forages and provides needed exercise, sunlight and fresh air for horses as well.

Recent research in Alabama and Kentucky has implicated the presence of a fungus, Epichloe typhina, with poor animal performance on tall fescue. Steers grazing fungus-free pastures have made nearly twice the daily gains of steers grazing fungus-infected pastures in tests in Alabama. The fungus occurs between cell walls of fescue stems and leaves and cannot be seen externally. It is apparently transmitted by seed and does not readily spread otherwise from field to field. Research at the University of Kentucky has linked the fungus with the loline alkaloid content of fescue. This group of alkaloids has been associated with the erratic performance of cattle on summer fescue pastures.

Whether or not the fungus or the alkaloid content of fescue is related to the reproductive problems of brood mares is not known. However, certain steps can be taken to reduce the risk of problems of horses associated with this grass:

1. Overseed an adapted legume in fescue pastures. This improves forage quality and animal performance. Red clover and Ladino clover are both well suited to growing with fescue.
2. Pregnant brood mares should be removed from fescue pastures preferably 90 days before but at least 30 days before foaling.
3. Feed a non-fescue hay on pasture.
4. If brood mares must remain on fescue pastures, feed alfalfa hay for the last 90 days of pregnancy.
5. If mares fail to develop udders four weeks before foaling, remove mares from pasture to dry lot or stable and feed alfalfa hay or alfalfa pellets with a non-fescue hay along with a concentrate for adequate levels of energy.
6. Foaling should be monitored carefully to assist foals in case of difficulty.

7. Make sure the foal nurses and that the mare has milk. Provide a milk replacer if needed.

Properly managed fescue can provide pasture with high carrying capacity and nutritionally able to meet the animals needs for maintenance. Stockpiled fescue is of high quality and extends grazing seasons for economical management. Research concerning antiquality factors may soon provide insights into the causes and prevention of nutrition and reproductive disorders associated with this grass. In the meantime, with proper management and supplementation when needed, tall fescue can provide an excellent pasture well adapted to most soil situations in Virginia.

SELENIUM IN HORSE NUTRITION

by

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Selenium - A Complex and Interesting Element

Selenium, a chemical element resembling sulfur in its chemical and physical properties, was discovered in 1818 by Berzelius in Sweden. He named it selenium after the Greek word for moon, selene. He had previously discovered an element to which he gave the name tellurium after the Greek word for earth. Selenium ranks 69th in order of abundance of elements in the earth's crust at a concentration of 0.09 ppm. Thus, it ranks in abundance between silver and gold. The element has a number of industrial uses some of which stem from its unusual light sensitive properties. For example, it is used in office copiers — the familiar xerox machine - and in electric door openers. It is also used in the manufacture of pigments, pharmaceuticals, rubber and glass. The industrial source of selenium is the copper refining industry and about 1 million pounds are used annually in the United States.

Selenium is present in varying degrees in soils throughout the world. In some areas, levels are quite low but in other areas, such as in the Great Plains and Rocky Mountain regions and in Venezuela, levels are high. Certain wet, organic soils in Ireland are reported to contain 850 ppm. Selenium in the soil is present in many forms which vary greatly in availability to plants. Also, certain plants have an affinity for selenium and can accumulate concentrations as high as 1.5% (15,000 ppm). The element is often present in uranium deposits and prospectors have used the so called selenium accumulator plants to aid them in their search for that rare element.

It may have been these plants that Marco Polo was referring to in his journals as "...a poisonous plant...which if eaten by (horses) has the effect of causing the hoofs of the animal to drop off" [Polo (Marsden's trans.), 1926]. In the 1800's, what was latter to become known as selenium toxicity was reported in U.S. Army horses in the Nebraska territory. The condition was called "alkali disease" which in its chronic form resulted in loss of hair from the tail and mane, abnormal hoof growth, lameness, anemia, salivation, grinding of the teeth, paralysis and eventual death. An acute form which can follow consumption of plants with very high levels of selenium results in a condition known as blind staggers which is characterized by elevated temperature, labored respiration, a bloody froth in the mouth and nose, respiratory failure and death.

Most of the early interest in selenium was focused on its role as a toxic element. However, in 1957 Schwarz and Foltz discovered that it was required in the diet of animals and it has since been included in a list of twelve essential trace elements along with chromium, nickel, vanadium, tin, zinc, iron, copper, iodine, manganese, cobalt, and molybdenum. It is now known that the areas where it is deficient far exceed those where selenium toxicity is a problem. Early nutritional studies revealed a relationship between vitamin E and selenium and for a time it was believed that the vitamin could

replace selenium in the diet. It was later shown that this was not the case and that some selenium was required irrespective of the level of vitamin E. Further studies have revealed a complex relationship between selenium, vitamin E., lipids, sulfur and sulfur containing amino acids.

A critical area of investigation has been the possibility of a relationship between selenium and cancer. Nelson, *et al.* (1943) reported low grade carcinomas in rats fed diets high in selenium and studies by Russian investigators appeared to confirm their findings. However, subsequent carefully controlled studies (Tinsley *et al.*, Harr *et al.* 1967) failed to establish a link between added selenium and the incidence of cancer. The earlier reports created a dilemma for the Food and Drug Administration since by terms of the Dulaney Amendment it is illegal to add a known carcinogenic substance to human food or feed for food-producing animals. Here was an essential nutrient which was reported to cause cancer yet it was needed to prevent deficiency symptoms in diets low in selenium. Furthermore, selenium levels of food from animals fed natural rations adequate in selenium would be as high or higher than would result from low level supplementation. Since 1979, the FDA has permitted the supplementation of livestock rations with selenium at the level of 0.1 ppm (0.2 ppm for turkeys) either as part of the complete diet or in a mineral mixture offered free choice.

Selenium has some interesting implications in human nutrition. Children suffering from kwashiorkor a severe nutritional deficiency, have been shown by Schwarz (1965) to respond to selenium supplementation. Other studies have shown that the presence of selenium in the diet is negatively correlated with breast cancer. It has also been suggested, as shown in table, that higher levels of selenium in the blood may be inversely related to cancer mortality. The highest concentration in human blood was in Rapid City, South Dakota while Lima, Ohio is a deficient area. Hypertensive and arteriosclerotic heart disease is reported to be less frequent in areas where relatively greater amounts of selenium is present in drinking water.

Table 1. Relationship of blood selenium levels (ppm) to cancer death rate per 100,000 population

	Blood Se (ppm)	Cancer Deaths (per 100,000)
Rapid City, South Dakota	0.256	94
Lima, Ohio	0.157	188

Scott, M. L., 1973, *Journal of Nutrition* 103:803

Selenium As An Essential Nutrient

Selenium was first shown to be an essential nutrient in 1957 with the discovery that it would prevent liver necrosis in rats and exudative diathesis in chickens (NRC 1980). This condition is the major manifestation of selenium deficiency in poultry and begins with edema in the breast and neck area. It advances to massive hemorrhages under the skin and accumulation of fluid throughout the body. Muscular dystrophy of the breast muscles is also common. The disease could be prevented by either selenium or vitamin E and this discovery prompted extensive research efforts to define the role of each

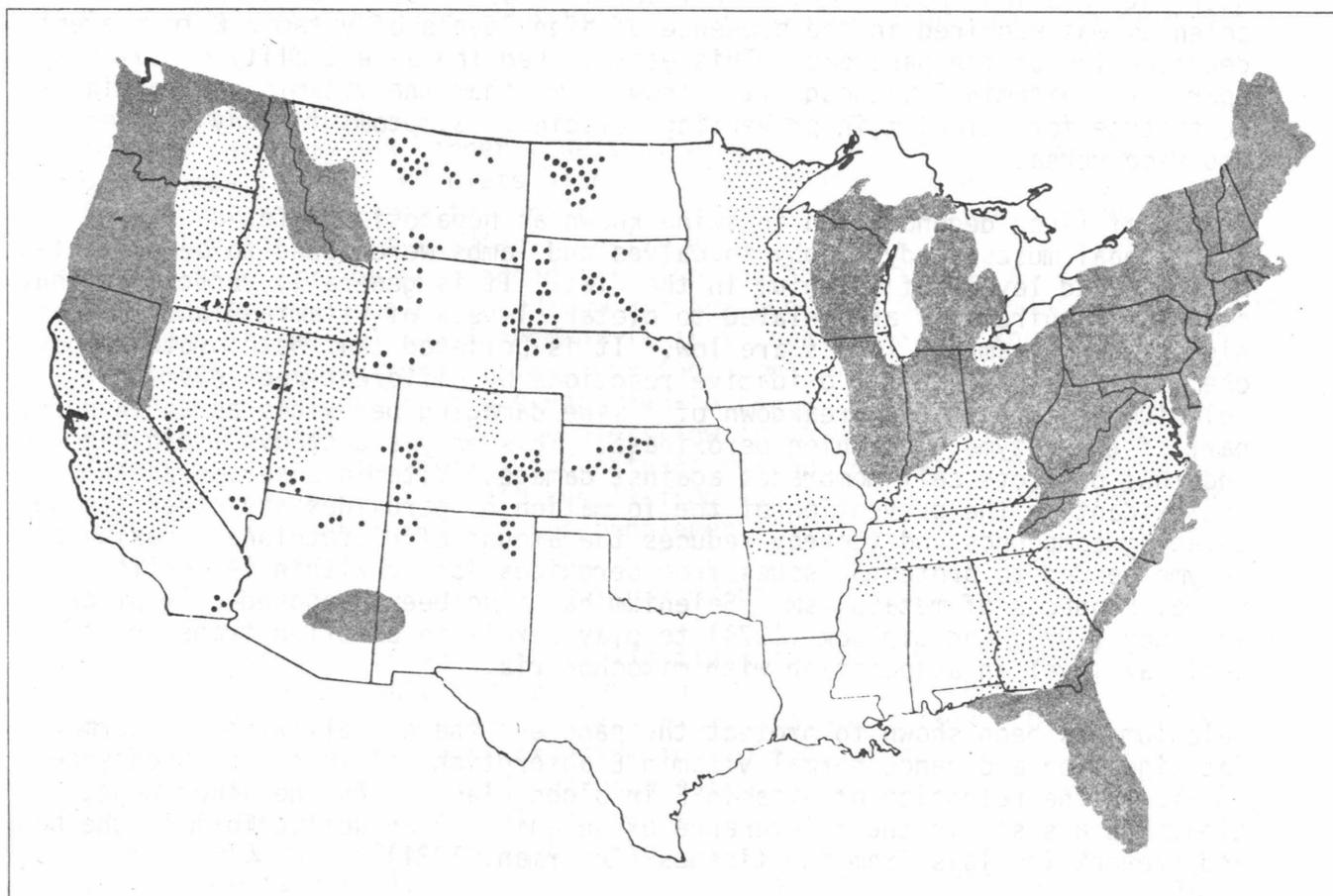
nutrient in animal nutrition. Scott and Thompson (1971) found that selenium was required in the presence of high levels of vitamin E to prevent degeneration of the pancreas. This established the essentiality of selenium apart from vitamin E although it is now known that the vitamin can partially substitute for selenium in preventing deficiency symptoms in many species and vice versa.

A form of liver degeneration in swine known as hepatosis dietetica and nutritional muscular dystrophy in calves and lambs were found to be prevented by increased levels of selenium in the diet. It is generally recognized that selenium requirements are related to dietary levels of vitamin E and will be higher when vitamin E levels are low. It is believed that both protect body chemistry against harmful oxidative reactions by different mechanisms. Selenium assists in the breakdown of tissue damaging peroxides as an integral part of the enzyme glutathion peroxidase. This enzyme destroys lipid peroxides and thus protects cell membranes against damage. Vitamin E serves as an antioxidant in the prevention of the formation of peroxides and other tissue damaging compounds and thereby reduces the amount of glutathione peroxidase enzyme needed to protect tissues from peroxides formed within the cells as normal products of metabolism. Selenium has also been proposed by Diplock and Lucy (1973) and Diplock (1974) to play a role in electron transfer at the cellular level in association with mitochondria.

Selenium has been shown to protect the pancreas thereby allowing for normal fat digestion and hence normal vitamin E absorption. It has also been shown to aid in the retention of vitamin E in blood plasma. On the other hand, vitamin E assists in the maintenance of selenium in an active form in the body and prevent its loss from the tissues (Ammerman, 1981).

Selenium Toxicity

Selenium toxicity is a problem in localized areas in many countries and generally affects grazing animals consuming forages containing high levels of the element. It is also known to occur in swine and poultry fed seleniferous grains. Figure 1 indicates those areas where accumulator plants may contain 50 ppm or more. Chronic selenium poisoning may occur when animals consume grains and forages containing moderately high levels of 5 to 40 ppm over a period of weeks or months. This is the alkali disease mentioned previously which affects hooves and hair and causes emaciation. Arsenic, certain other mineral elements, dietary sulfate and methionine have been shown to reduce the toxicity of selenium under specified conditions. Linseed meal also has unique protective ability against chronic toxicity. Since selenium content of grasses is high in young plants and declines rapidly with maturity, ranchers in high selenium areas graze pastures with low selenium content during the growing season and utilize forages from troublesome areas late in the season. Acute toxicity or blind staggers occur when animals are forced to consume accumulator plants because pasture is limited. This is a rare occurrence since animals usually avoid these plants. Fortunately, these problems do not confront Virginia horse owners--since we are located outside of the areas of high soil and plant selenium concentration. However, horse owners should be aware of the potential for toxicity that could develop from overuse of selenium by injection coupled with additions to feed salt and vitamin-mineral supplements. Supplemental selenium from more than one source should only be used after consultation with and upon the advice of a veterinarian.



- Low area; approximately 80% of all forage and grain contains < 0.05 ppm of selenium.
- Variable area; approximately 50% contains > 0.1 ppm.
- Adequate area; 80% of all forages and grain contain > 0.1 ppm of selenium.
- Local areas where selenium accumulator plants contain > 50 ppm.

Figure 1. Regional distribution of forages and grains which are low, variable, adequate and toxic in selenium. Prepared by Kubota and Allaway (1972).

Selenium Deficiency in the Horse

Knowledge of selenium deficiency in horses is more recent and less complete than knowledge of the effects of toxic levels. In 1960, workers in New Zealand reported muscular problems in foals and adult horses which they attributed to selenium deficiency. Muscle degeneration and a condition known as "yellow fat disease" was described in foals by Dodd, et al. (1960). Hartly and Grant (1961) reported white muscle disease in foals and a "tying up" condition in race horses which they associated with exercise following a few days on high energy rations. Stewart (1960) concluded that the tying up condition could be cured by supplemental selenium administered through the drinking water.

H. E. Stowe (1967) reported blood serum levels for deficient foals, normal foals and adult horses as shown in table 2. He found that foals fed a

Table 2. Blood serum selenium levels in horses

No Supplemental Se	ug/ml	Supplemental Se	ug/ml
Deficient foals	3.7	Foals, 0.5 ppm Se	14.7
Normal foals	7.0	Foals, 1.0 ppm Se	15.3
Weanlings	14.7	Foals, 2.0 ppm Se	16.7
Yearlings	13.1		
Adult mares	12.7		
Adult stallions	12.1		

H. E. Stowe, 1967, Journal of Nutrition 93:60

deficient diet and raised in an environment which restricted access to bedding exhibited levels of serum selenium approximately one half those of foals nursing their dams. Foals reared normally had lower serum selenium levels than young or mature horses. Foals which received supplemental selenium had levels comparable to those of older horses and even at higher levels of supplementation of the diet (2.0 ppm), blood levels were not greatly different from those of adult horses. Selenium supplemented foals tended to grow faster than unsupplemental foals.

The myopathy due to vitamin E-selenium deficiency is recognized in foals from birth to 7 months of age. It is known to occur in 14 countries throughout the world and is acute in its onset. Foals exhibit stiffness and lethargy which is often followed by recumbancy and death due to respiratory failure. In less acute cases, a stiff gait and abnormal carriage of the head and neck may occur (Owen, et al. 1977). More recently, a survey of breeding farms in New York (Maylin, et al. 1980) led to the conclusion that selenium deficiency could be the cause of reproductive problems and foal deaths. Robinson and Slade (1974) asserted that selenium injections were effective in preventing muscular degeneration and yellow fat disease in foals. They suggested that the daily dietary requirement for selenium for the horse is 240 ug/100 kg of body weight. Stated in terms of dry matter intake, this calculates to approximately 0.1 ppm (0.1 mg/kg of dry matter).

Some workers (Brady, et al. 1979) have proposed that the incidence of selenium and vitamin E deficiency symptoms increase with increased physical stress or exertion. In studies with rats, there was evidence to suggest such a relationship. Canadian workers (Owen, et al. 1977) found low serum selenium values in horses suffering from colic which also exhibited symptoms of myocardial failure and skeletal muscle disease. Other horses suffering from colic but with normal serum selenium levels did not exhibit the muscular involvement reported in five horses treated at the Ontario Veterinary Research Center. Soils and forages grown in the area are known to be low in selenium and could have been at least partially responsible for the low serum selenium levels. It was reported that in Saskatchewan, a region of adequate selenium levels, no similar muscular complications had been observed in horses treated for colic. When the horses in Ontario were fed western oats in winter, blood serum levels tended to increase. The selenium level in these oats was

reported to be .35 ppm. Wilson (1976) found signs of nutritional myodegeneration in horses fed rations low in selenium. In these studies, the oats contained 0.039 ppm and hay 0.027 ppm. Pasture was reported in the "normal" range at 0.092. Symptoms observed included pale muscle and yellow staining of adipose tissue. Wood (1964) found selenium and vitamin E therapy to be effective in treating "myocytes" in an aged jumping mare. The treatment relieved stiffness and improved performance in this animal.

Two recent reports from Missouri by Heimann (1981) have suggested selenium may have a role in the reproductive abnormalities that have been observed in mares grazing fescue pastures. According to a survey being conducted by the University of Missouri (Garrett, et al. 1980) such mares have an increased incidence of agalactia, prolonged gestation, and perinatal mortality caused by the foal failing to break through the placenta at the time of parturition. It is interesting to note that retained placentas are more common in dairy cows with low selenium levels in the blood and that the problem can be alleviated through the administration of selenium and vitamin E as reported in Animal Nutrition and Health (1978).

Heimann found selenium levels in fescue pastures were increased by nitrogen fertilization and that mares grazing pastures fertilized with high levels of N had more serum selenium than did mares grazing fescue that received a low level of nitrogen fertilization. Furthermore, supplemental selenium given by injection also increased serum selenium levels. Mares supplemented with selenium had no reproductive abnormalities whereas 50% of the mares grazing fescue but receiving no supplemental selenium exhibited agalactia and/or the foals suffocated within the placenta. The number of mares used in these studies was too small to establish other than that selenium supplementation exhibited a trend toward improved reproductive efficiency in mares grazing fescue. More research is needed in this area to define what the relationship of selenium might be to problems observed in mares grazing fescue pastures. The animals in these Missouri studies did not exhibit excessively low plasma selenium levels in this study and are in agreement with those reported by Stowe (1967). As shown in table 3, there was a tendency for mares grazing fescue fertilized with a high level of nitrogen to have higher selenium levels than those grazing fescue receiving a low rate of nitrogen fertilization. Also, selenium supplementation by injection (2.5 ug Se/45.5 kg body weight/14 days I.M.) had a positive effect on increasing plasma selenium concentrations. However, all values were above levels suggested as being indicative of deficiency as suggested by Anderson (1978). He proposes that horses with Se levels of 0.065 ug/ml or less may be deficient in selenium.

Table 3. Plasma selenium concentrations in mares grazing fescue fertilized with high and low levels of nitrogen and with or without supplemental selenium.

Treatment	Plasma Se ug/ml
High N + Se	0.179
High N - Se	0.164
Low N + Se	0.172
Low N - Se	0.129

Heimann, et al. 1981. Proceedings, 7th Equine Nutrition and Physiology Symposium.

Fertilization with nitrogen increased the mean level of selenium in the fescue forage from 0.096 ppm at the low nitrogen level to 0.136 at the higher level of nitrogen. The higher level of nitrogen fertilization did not have an effect on inducing reproductive abnormalities in the mares. This suggests that well managed and well fertilized pastures may be beneficial in reducing the incidence of problems occurring at foaling time.

Selenium in Feeds and Forages

As shown in figure 1, all of Virginia is considered to be marginal or low in selenium content of crops and forages grown in the region. A level of 0.1 ppm is considered adequate and many feeds may fall below that level. Fontenot (1977) reported levels lower than 0.1 ppm in locally grown feeds although protein supplements, particularly linseed meal were considerably higher in selenium concentration. The values given in table 4 suggest that horses fed entirely on locally produced feeds may be more at risk than horses fed grains shipped in from other areas, presumably where selenium levels in the soil will result in greater concentrations in the plant.

Table 4. Selenium in feedstuffs

Feedstuff	Selenium content ppm dry bases
Linseed meal	1.082
Soybean meal	.072
Grass hay	.056
Corn grain	0.028
Orchard grass hay	0.072
Pasture forage	0.056

Livestock Res. Report, 1977, VPI&SU

Many commercial feeds are now supplemented with selenium at the 0.1 ppm level. Various supplements and additives containing selenium are also available and may be good additions to the ration of pregnant mares, mares nursing foals, foal creep rations and perhaps for rations of horses with a history of muscle problems. Use of such supplements should be carried out judiciously in the light of potential hazards of over supplementation. It has been suggested by several authors that 5 ppm in the diet is a potentially toxic level. This gives a 50 fold margin of safety for feeds containing 0.1 ppm. However, indiscriminate use of selenium shots, ration supplements and feeds such as linseed meal without concern for total selenium being offered would be unwise. Livestock mineral mixtures containing up to 1.0 ppm of selenium are available and may be used for free choice feeding to supply macro and trace minerals. The use of such a mineral mixture may satisfy the need for selenium for most horses in Virginia along with that naturally present in feeds. Additional supplementation by injection should be carried out under the advice of your veterinarian.

Summary

While selenium first drew attention because of its toxic properties, it now appears that its essential role in nutrition and the potential for deficiency

suggest that the careful horse owner will give consideration to this nutrient in planning a feeding program. Several routes of administration are possible but use of a salt-mineral mixture containing selenium should be effective for most situations.

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Plans for Virginia Tech Horse Program

Dr. T. N. Meacham
Animal Science Department

Introduction

As the total horse industry experienced a rapid expansion in the 1960's, there was a strong demand for research and educational programs to support this growing industry. Virginia Tech added an extension horse position in the late 60's. The first horse research, a cooperative study with 14 Virginia horse farms, was conducted in 1967. A horse management course was initiated around 1968. Our equitation program followed in 1969. Ten ponies were purchased in 1973 for our initial horse nutrition research. A small six-stall barn was built in 1974. In 1978 a teaching-research position was added by the department to expand the horse nutrition and management program.

Present Programs

A. Teaching

Today we offer four courses devoted to horses at the undergraduate level and one graduate course -

AnSc 2030	-	Stable Management
AnSc 3020	-	Horses (non-majors)
AnSc 4080	-	Horse Production
AnSc 4110	-	Equine Evaluation
AnSc 5100	-	Horse Nutrition

Our equitation program consists of three levels of hunt seat (and one stock seat) equitation.

The hunt seat classes are taught each quarter. Stock seat equitation is offered in the winter and spring. For those who want additional experience with horses we have field study, independent study and undergraduate research programs available for individual students with special interests and/or abilities. The enrollment in these classes reflect the expanding student interest in horses.

B. Research

Currently our horse research involves projects in the following areas:

1. Energy requirements for the gestating mare.
2. Hormonal responses in the mare to GNRH challenge.
3. Utilization of added fat in horse diets.
4. Role of the small intestine in digestion.
5. Foal growth patterns as influenced by month of birth.

Our research facilities consist of the original six stall barn, a converted sheep shed containing eight feeding stalls and about 15 acres of pasture "stolen" from the ruminant nutrition program. The analytical work has been done in other peoples laboratories. In the new Animal Sciences building we do have a horse nutrition laboratory, but funds are needed to equip it.

The horse inventory presently is made up of 8 ponies, 8 registered Saddlebred mares, 3 Morgan mares, 2 Arabian mares, 5 weanlings, 5 yearlings and a Saddlebred and a Morgan stallion. These animals are used extensively in both the teaching and research programs. The breeding stock has been donated to the university by horse farms throughout the state. Donated stallion services have also been valuable contributions to the program.

C. Extension

The third mission of the Virginia Tech horse program is the extension or continuing educational program conducted by the Virginia Cooperative Extension Service from Virginia Tech and Virginia State University, Petersburg. The bulk of this work is done by extension agents located in most counties and cities in the state. The agents do a tremendous job with the two major phases of extension programs, adult 4-H youth. Four-H is an integral part of the total extension effort. Approximately 8,500 4-H youth are enrolled in the 4-H horse project program and the industry provides tremendous support to this program. Youth are involved in hundreds of local events including meetings, farm tours, trail rides, shows, parades, clinics, etc. Over 1500 youth participate in the major state events (many with local, district and state schedules) including judging, shows, pleasure ride, combined training, packing and camping, competitive ride, achievement records, horse bowl and demonstrations. Virginia 4-H horse judging contest six times during the past nine years. Virginia 4-H members also successfully compete in the Southern Regional 4-H Horse Championships.

The adult program includes schools, seminars and demonstrations conducted by extension agents with support from the state specialists. Soil and forage tests, and pasture, nutrition and other management recommendations are all part of the role of the extension staff. Newsletters, and educational materials are published regularly by the state staff. Statewide and national symposia and short courses are conducted as a part of the horse extension program for adults.

D. Staff

Three faculty members are specifically assigned the horse program. Dr. T. N. Meacham - teaching and research; Miss Susan Stuska - teaching, equitation; and Dr. A. N. Huff - extension. A graduate teaching assistant is also assigned to Dr. Meacham.

Industry Situation Statement

The horse industry is a major agricultural industry in the state. There are 86,753 equines, 36,469 owners and 1271 breeding farms in the state. Virginia citizens have a total investment of \$697,000,000 in the horse industry which produces a total annual income of \$70,000,000. The annual gross product (contribution to the economy) of the industry amounts to \$322,000,000. The industry has declined in number of farms and horses but quality of product and investment has increased.

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, hay and grain farmers, tack suppliers, veterinarians, veterinary medical suppliers, industry management personnel, barn and fence builders, farm equipment retailers, trailer sale firms, farm and industry labor, horse show suppliers, secretarial and business management staff, 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. Riding programs for the disadvantaged and handicapped youth have unlimited potentials.

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 research and educational program is required to enhance the social and economic development of this industry.

Future Plans for Teaching and Research

A. Teaching

Addition of a horse behavior and training course.

B. Research

1. Continue problem solving and applied cooperative research as needed by the industry.
2. Continue current research in nutrition, management and reproductive physiology.
3. Initiate specific research pertaining to: forage utilization, fescue problems, nutrition-exercise interrelationships, and growth studies.

4. Horses can be obtained through donations and very high quality horses may be used if facilities are representative. Non-competitive sales from such horses can produce a sizeable income for teaching and research programs. Land is currently available on a limited basis. The current plan does not call for over 35 to 50 head of horses for teaching and research. The current plan is to continue the equitation program at a private facility.

Extension Needs and Requests

1. Establishment of an additional Extension Specialist position in Northern Virginia to work all programs and areas but primarily to conduct extension and cooperative research related to nutrition, management and breeding management. Positions: Staff, \$25,000; Support, \$10,000.
2. Assignment of a full time instead of a half-time secretary to the Extension horse specialist. The current workload clearly indicates a need for this long standing request. Position: \$13,000.
3. Increase annual budget support items above current level for horse extension specialist. Printing, materials and equipment and travel, \$7,000.
4. Establishment of a position to coordinate handicapped riding programs. Donor funds are available to help initiate this and this also has been a long standing request. Positions: Qualified instructor, \$16,000; Support, \$5,000.

D. Proposed Horse Research and Teaching Unit

Justification

1. An appropriate facility in which to properly conduct current and future research.
2. To demonstrate a representative facility for research and teaching for students and industry commensurate with the industry.
3. To develop a quality program including quality horses for student and research use.
4. Provide facilities for extension for clinic demonstrations, seminars, etc.
5. Provide on cooperative basis a quality unit for the use of the College of Veterinary Medicine in training equine practitioners.
6. To provide indoor facilities for year-round programs.
7. To provide an indoor teaching arena for all students and for all industry groups. The arena should be large enough for horse events

and suitable for horse work but yet designed for and used as a multi-purpose facility which is greatly needed by the department. Again, no such facility is available and student numbers in classes alone indicate a critical need for such a facility. This would be for use in horse, beef, sheep and swine programs.

8. To conduct all university horse programs on a quality, representative, industry related and realistic basis.

Plans of Proposed Unit

(Figures 1-4 attached)

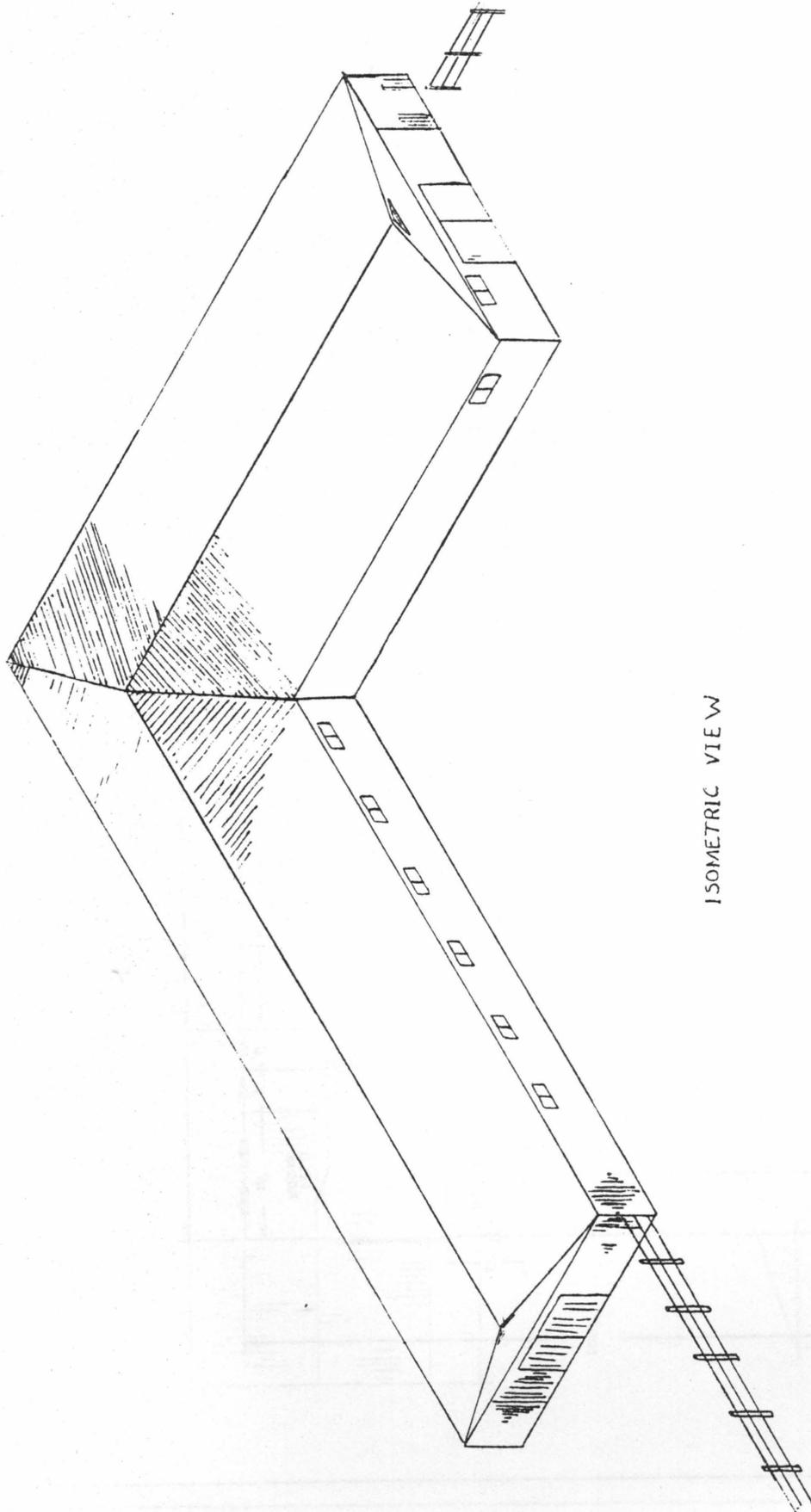
Funding Requested for Horse Unit

1. Capital Outlay

Horse Research & Teaching Facility	\$266,000
Multi-Purpose Teaching Arena (Horses, sheep, swine and beef cattle use)	\$600,000
Horse Fencing, Equipment, and Adjunct Facilities	\$125,000
Small hay and equipment storage (Plan not attached)	\$ 25,000

2. Operations (annual)

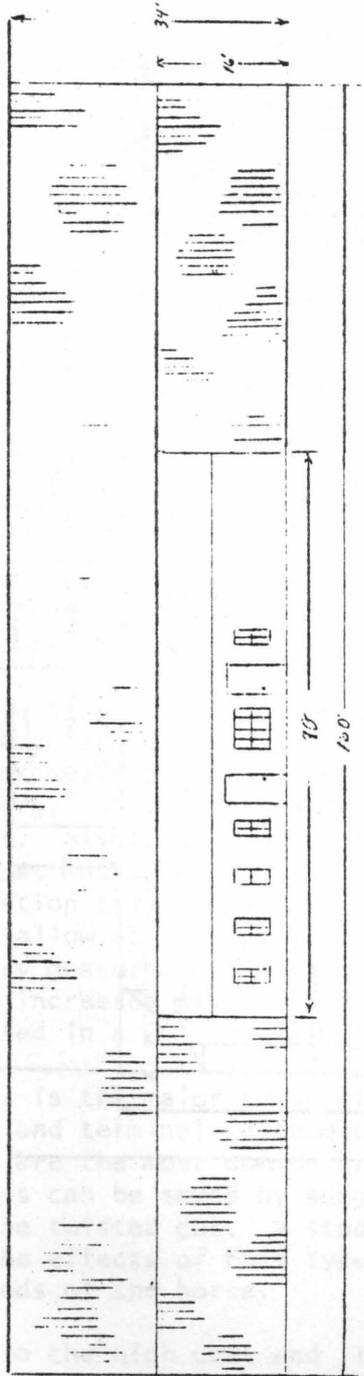
Research Supervisor (Farm Manager)	\$ 11,000
Lab Technician B	\$ 10,246
Student Labor	\$ 5,000
Operating Funds (Feed, health care, utilities, maintenance, supplies)	\$ 30,000
Graduate Student Instructor (Equitation and Stable Management) Part-time	\$ 5,000



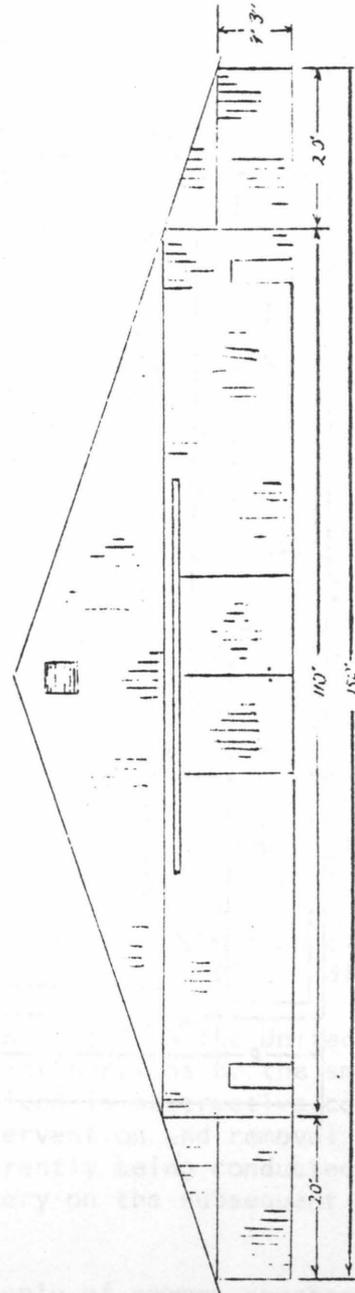
ISOMETRIC VIEW

EQUINE RESEARCH AND
TEACHING FACILITY
SCALE: 1/4" = 1'-0" DATE: 3/21/87

MULTIPURPOSE ARENA

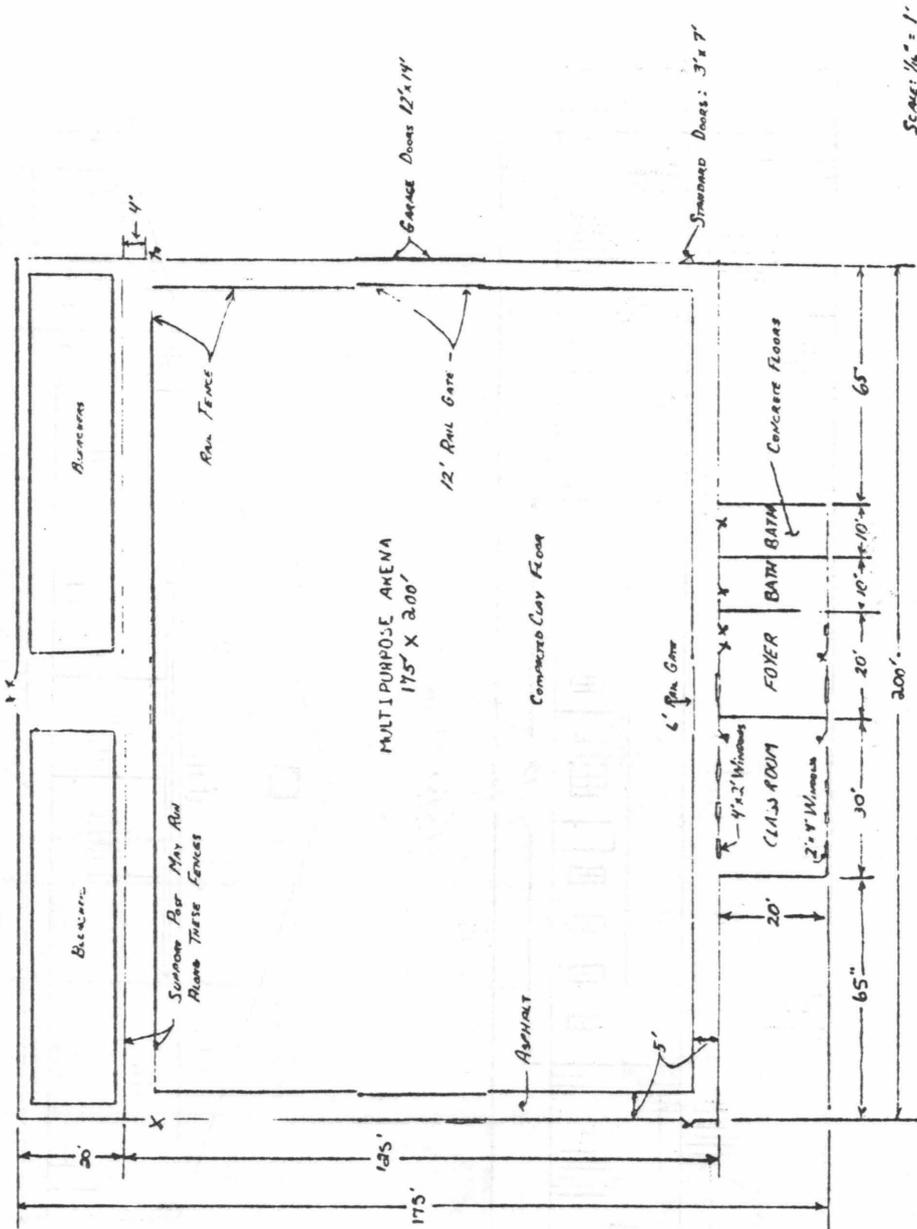


FRONT VIEW



END VIEW

Scale: 3/32" = 1'



Applied Review of Virginia Tech Horse
Nutrition Research

Laura Goater, Ph. D. candidate in Horse Nutrition

The addition of fat to poultry and certain livestock rations for its caloric value has become a widely used practice. With the increasing cost of feed, it is necessary to explore alternate sources of nutrients. Currently, corn and oats supply the energy in horse concentrates in the form of carbohydrates. Fats and oils contain 2.25 times as much energy as carbohydrates, thus it seems that we could increase the energy intake of the horse by incorporating fats into their feed.

The acceptability and digestibility of mixtures containing ten selected fats of animal, or vegetable sources were studied. Corn oil ranked as the most palatable source of fat in comparison to nine other sources. However, when horses were fed only one choice of either corn oil, inedible tallow, peanut oil or blend no. 3, they consumed similar amounts of all four fats.

In the first digestion trial, the apparent digestibility of energy in corn oil, added at 10%, was 95.4% compared to 70.4% for blend no. 3 and 74.4% for inedible tallow. The addition or source of fat did not alter the absorption of minerals. Serum cholesterol increased by the addition of 10% fat to the diet. However, levels of glucose were unaffected.

In the second digestion experiment, the apparent digestibility of energy in corn oil, peanut oil, inedible tallow and blend no. 3 were not different from each other.

We are also interested in the value of energy supplied by fat from a performance standpoint. Studies with human athletes have shown that fatty acids spare glycogen stores during exercise. In the horse, a higher energy density ration can be fed with fats without the risk of founder. Also, it may be that fats can increase the performance of horses at sustained submaximal exercise.

Digestion trials were conducted using corn oil, blended fat and inedible tallow as the fat sources. Heat production values and respiratory measurements were obtained. Total heat production for each diet increased with the addition of fat. The addition of 15% fat resulted in a 20% increase in the energy balance of the diets.

Colic is the major cause of death in horses in the United States. The ileum and terminal jejunum or the lower portions of the small intestine are the most common areas involved in obstructive colics. Colic cases can be saved by surgical intervention and removal of the area of the twisted gut. A study is currently being conducted to examine the effects of this type of surgery on the subsequent nutritional needs of the horse.

Due to the high cost and limited supply of common roughage, alternate sources of roughages for horses may be important. Less palatable feedstuffs may be incorporated into pelleted diets. This study compared the palatability of corn cobs and soybean hulls with alfalfa meal as a base for pelleted feeds. In the first trial, horses consumed their feed in 32 minutes for alfalfa pellets compared to 38

minutes for corn cob base pellets. During 60 days, the horses eating alfalfa based pellets lost 42 lbs. while those on corn cob pellets lost 34 lbs.

In the 2nd trial, the consumption times for soybean hull pellets and alfalfa were 27 minutes and 34 minutes per feeding. The horses eating soybean hull pellets maintained their weight while the horses receiving alfalfa pellets lost 23 lbs. in 60 days.

In both trials, much wood chewing was noted.

A study was conducted to determine if there were any differences in acceptability and consumption rate between two pelleted feeds, one with pellets 1/2" in size, the other with pellets 10/64" in size.

There was a preference for the small over large pellets. Mature horses consumed 62% and weanlings 91% of their total feed in small pellets. There was little difference in consumption time between the two pellets. Feeding pellets twice a day versus once a day, particularly with weanlings is recommended to assume complete consumption.

Acceptance of a high energy supplement was also examined. At the beginning of the two week trial, both horses and weanlings preferred feed without the supplement. By the end of the trial, the supplement was more acceptable. Levels of 1, 2 and 5 times the recommended amount of supplement were examined. Both horses and weanlings consumed feed containing 2 times the recommended level; with 5 times the recommended level, there was a depression in feed intake.

Preference between two high energy (fat based) supplements was tested. The difference in supplements was in the fatty acid composition of the supplement. Final results showed no definite preference by the horses for either of the two supplements.

Preference between two high energy supplements of different consistency was examined. Horses were given a choice of two feeds containing either a supplement that was in a hard pelleted form or a supplement that was in a soft pelleted form. During the initial period of the 3 week trial, both weanlings and horses preferred the soft pellet over the hard pellet. In the final period, they still preferred the soft over hard pellets but the margin of difference between the two had decreased indicating a gradual acceptance of the hard pellet.

APPLIED REVIEW OF VIRGINIA TECH HORSE
REPRODUCTIVE PHYSIOLOGY RESEARCH

Michael J. Fennell
Animal Science Department
VPI & SU

Until as little as 30 years ago, the horse in its many forms was man's most important domestic animal -- vital in war, all types of agriculture, for transportation and even as a source of meat when necessary. Modern technological advances have negated most of these functions, but the horse continues as an important agricultural industry as an end object primarily of recreation and sport.

Due to the decline in the agricultural and military requirements for the horse, we also experienced a decrease in the industries' pressure to maximize breeding efficiency in this species. Horse breeding between 1940 and 1970 has been controlled much more by fashion and whim than by simple monetary pressure. Large-scale research into the methods of controlling reproduction in the horse has not kept pace with the other large domestic species over the past few years. Recently there has been a renewed need for and interest in equine research. We at Tech have done some research on both the endogenous endocrine mechanisms for controlling the mares reproductive cycle and also in the exogenous methods for controlling her cycle.

Reproductive Efficiency on Fourteen Horse Farms
C. A. Hutton and T. N. Meacham (1968)

A better knowledge of the normal reproductive performance of the horse is needed as a background for studies directed toward improving reproductive efficiency. Detailed information on the reproductive efficiency of breeding farms under various systems of management is of value in locating problem areas and factors affecting this efficiency. This study was undertaken for the purpose of making such observations on selected farms where detailed records were available.

Results

Reproductive efficiency was estimated from breeding records involving 1,876 mare-years on 14 farms. Conception, foaling, and weaning efficiency means were 80.1%, 73.8% and 70.8%, respectively. Individual service data showed 1.71 estrus periods/mare-year, 2.75 services/mare-year and 1.61 services/estrus period. Considerable variation in efficiency between years and farms was noted. The conception rate varied seasonally, being very low in January and February, rising to a peak in May and declining gradually thereafter. The conception efficiency of mares reached a peak of 89.6% at age 9 and declined at age 15 to below 70%.

This study showed great variability in reproductive efficiency between breeds, farms, and years. This indicates that the equine species is capable of efficient reproduction under certain conditions which may therefore contribute to the success of the horse industry.

Progesterone and Luteinizing Hormone Levels in Pregnant Mares
 B. B. Thomas, T. N. Meacham and F. C. Gwazdauskas (1980)

The significance of progesterone (P) and luteinizing hormone (LH) in maintaining pregnancy is well documented in many species but little is known concerning the concentrations throughout pregnancy in the mare. This study was conducted to evaluate plasma P and LH concentrations in problem mares treated with progesterone from day 36 to 310 of gestation.

Results

Five pregnant American Saddlebred mares were used in the study. All five gave birth to normal healthy foals. There were no complications during parturition or postpartum periods. Overall, there was little difference in the mean (P) levels between the two groups (Table 1). The reduced level in the treatment group during the fourth period suggests that the progesterone level could have dropped lower if progesterone wasn't administered. It has been reported that if the level of progesterone drops to a low level (1 ng/ml) abortion is likely to occur. It is in these mares that progesterone therapy may prevent abortion.

TABLE 1. PROGESTERONE AND LUTEINIZING HORMONE CONCENTRATIONS

Periods	Control		Progesterone Treatment	
	Progesterone	Luteinizing hormone	Progesterone	Luteinizing hormone
	ng/ml	ng/ml	ng/ml	ng/ml
I 36- 50	5.2	41.7	10.5	50.9
II 62- 76	6.3	29.2	9.8	47.2
III 91-105	8.5	53.5	6.4	45.2
IV 111-125	10.9	48.0	2.2	25.2
V 151-165	4.6	32.7	4.3	14.9
VI 220-234	4.2	8.3	4.7	8.3
VII 294-308	8.7	2.7	4.1	15.9

Reproductive Efficiency On Horse Farms Utilizing
 Artificial Insemination
 S. G. Jennings, T. N. Meacham and A. N. Huff (1981)

The use of artificial insemination (AI) in horse production has increased dramatically in the last 15 years. Several studies have been conducted to

determine the overall effectiveness of AI as a management tool, but, there have been no reports examining the specific management practices in the field.

The objectives of this study were 1) to analyze the management procedures of 6 horse farms utilizing AI in their breeding operations and 2) to measure the reproductive efficiency of mares and stallions in AI programs.

Results

From the data collected, reproductive efficiency by farm, reproductive status of mare, month of breeding, age of mare and stallion were determined.

$$\text{Conception Rate (CR)} = \frac{\text{No. Mares Pronounced in Foal}}{\text{No. Mare Bred}} \times 100$$

- 1) Five Farms-----312 mares were bred and 248 conceived. Resulting in a CR of 79.5%
- 2) CR by Month (across farm)
Highest in May and June (55%)
Lowest in February (22.9%)
- 3) CR by Age (across farm)
2 years - 6 years (85.5%)
7 years -12 years (80.5%)
13 years or more (75.2%)
- 4) CR by Reproductive Status (across farm)
Barren (75.2%)
Maiden (88.1%)
Lactating (81.5%)

The results of this study indicate that the keys to a successful AI program are essentially the same as for a hand breeding operation. A good teasing program, reliable records system and good sanitation in the breeding shed are of critical importance. Palpation of the mares and the rest of the reproductive tract per rectum also showed to reduce the number of inseminations required per mare. Despite the increasing success of AI, there are still areas that need to be investigated. One of these is the effect of nutrition in reproductive efficiency. The lack of reliable information on this subject was reflected in the extreme diversity of feeding programs on all farms.

Response to GnRH Injection at Two Different Stages
of the Mares Reproductive Cycle
S. Bartko, T. N. Meacham and F. C. Gwazdauskas (1982)

Objectives

To determine the amount of Gonadotropin Releasing Hormone (GnRH) needed to elicit a response from the mares reproductive system at 2 stages of the mares cycle. Serum LH, Progesterone and Estradiol will be analyzed by RIA procedures.

Experimental Procedure

Each mare (8) will receive an IV injection of GnRH at ovulation (Day 0) and at mid-diestrus (Day 7-9) of the cycle. Each mare given GnRH will be sampled at -2, -1.75, -1.5, -1.25, -1, -.75, -.5, -.25, 0, .25, .5, .75, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.5, 2.75, 3, 4, 5, 6, 8 hour in relation to the injection time (Time 0). Four treatments will be examined in the study, 100 ug GnRH, 400 ug; 1600 ug and a control treatment of saline. Hormone analyses of luteinizing hormone, progesterone and estradiol concentrations are presently being performed.

Effect of Dietary Energy Levels in Mares During Gestation and Lactation

L. E. Goater, T. N. Meacham and F. C. Gwazdauskas (1981)
M. J. Fennell, T. N. Meacham and F. C. Gwazdauskas (1982)

The nutrient recommendations suggested by the NRC for horses, particularly the gestating mare, are not substantiated by experimental evidence but are based on theoretical calculations and interpolations from research with ruminants or from research with draft horses. Nutritional management of the brood mare is of special concern. The average conception rate is approximately 60% and the abortion rate about 11%. The interaction of nutrition and reproductive demand on the mare with regards to energy is crucial during the last 90 days of gestation. During this time, the fetus grows at a rate greater than .5 kg per day; the mare is also preparing for lactation and rebreeding.

Objectives

The primary objective of these research studies is to evaluate the effects of feeding 100 or 120% of the recommended DE level (NRC, 1978) to the pregnant mare during the last 90 days of gestation. The specific objectives are to:

- 1) Compare foal birth weights and gains, and weight changes of the mares during gestation and 30 days lactation.
- 2) Determine the effect of dietary energy levels on peripheral plasma levels of progesterone, luteinizing hormone, and prolactin.
- 3) Assess the mare's pituitary responsiveness to GnRH at 4 and 6 days postpartum by measuring LH concentrations, estrus behavior and rectal palpations of the ovaries for follicular status.

Results

Results showed that the 120% DE offered to pregnant mares during the last 3 months of gestation appears to give an advantage to foals and mares in weight gain during 30 days postpartum. No effect of dietary treatment on progesterone (P) and luteinizing hormone (LH) was evident in the (1980-81) trial. Dietary energy at levels of 100 and 120% NRC had no differential influences on subsequent reproductive performance as measured by LH response to GnRH at 4 days postpartum in the (1980-81) trial. The

effect of dietary treatment on P, LH, prolactin, GnRH at 6 days postpartum, and the elucidation of follicular status during the immediate postpartum reproductive cycle is still to be determined for the (1981-82) trial.

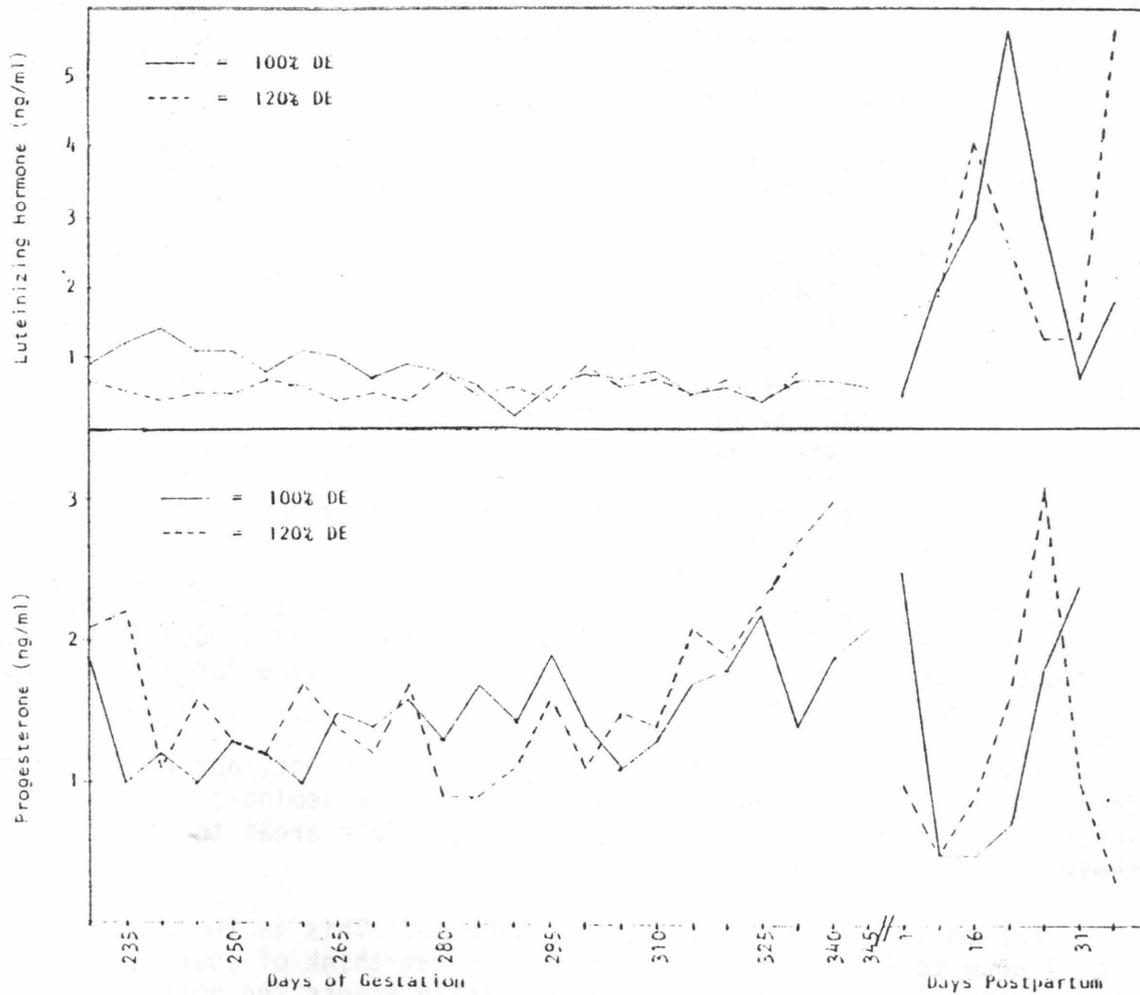


FIGURE 1. PLASMA PROGESTERONE AND LUTEINIZING HORMONE CONCENTRATION DURING GESTATION (DAY 235 TO FOALING) AND 30 DAYS POSTPARTUM

(Each point represents the mean of five mares)

"First Aid for Horses"

Dr. K. Jack Easley

Virginia-Maryland Regional College of Veterinary Medicine
VPI, Blacksburg, VA

By definition, equine first aid is emergency care or treatment given to an ill or injured horse before regular veterinary care can be obtained. With good management practices, most illness and injury can be prevented. Therefore, I would like to introduce the topic of equine first aid with a few words on prevention or pre-aid.

Horses in general are very accident-prone animals and frequently suffer from injury. This can be attributed to two basic causes: (1) horses by nature run when frightened (flight from fright reflex) and (2) man frequently provides an unsafe environment for the horse. Most injuries occur at moments when management is not at its best. Bumps, cuts, sprains, and fractures are usually the direct result of overcrowded conditions or dangerous objects in pasture. Barbed wire fences, metal barns or sheds and protruding nails or split boards account for the majority of lacerations. Pasture obstacles such as holes, down or low tree limbs, wet slick areas, metal fence posts and machinery are to blame for many bumps, punctures and fractures. Like children, horses need to be protected from the dangerous temptations of an "attractive nuisance."

Improper training or too early or vigorous competition subject horses to breakdown injuries such as buck skins, bowed tendons, and chip fractures. Shoeing and trimming practices are to blame for some serious injuries seen during competition.

Preventive veterinary medicine, equine management, and conditioning are vast topics that need to be covered in future seminars. I would advise anyone with a need for information in these areas to consult their local veterinarian.

What to do when we find an injured horse? This is the question that I hope to address in this seminar. First think of yourself as an investigator and paramedic. You must quickly assess the horse's condition. This should begin with a general observation of the horse. Is he calm and quiet, depressed or visibly upset, even violent? Is the horse exhausted from fighting the injury or in shock? This can be ascertained from the expression on his face and observing the eyes and mouth. A horse in pain may squint his eyes and grind his teeth. If he is in shock from stress or blood loss his gums will be pale. Horses with bright red or bluish gums may be suffering from dehydration or toxic shock. The gums' ability to recover its color after blanching is a good indication of the circulatory systems health. A normal horse's gum color will recover in 1-1.5 seconds following blanching. The heart rate is another indicator of the horse's condition. The normal equine resting pulse rate is 35-45 beats per minute. If the pulse is weak and rapid this is another indication that the horse is suffering from shock.

A strong rapid pulse may indicate a stress response from pain or fright with the release of adrenalin. Cold ears and limbs are another indicator of shock. The body is redirecting the blood flow away from these non-vital areas so that more is available to supply the brain and lungs.

Do not attempt to treat injuries of a horse in shock until his body functions have been stabilized. Keep the horse warm with a blanket to retain body heat and notify a veterinarian at once. A horse in shock should never be moved until the shock has been treated.

The next step is to determine the type of injury. Is the condition quite obvious such as a large laceration or more subtle as in the case of an acute sprain or mild colic?

EQUINE FIRST AID SUPPLIES

Treating Lamenesses

- _____ Epsom salts and soaking bucket for drawing inflammation from feet and lower legs
- _____ Phenylbutazone tablets for controlling pain and reducing inflammation
- _____ Dimethylsulfoxide (DMSO) for reducing swellings
- _____ Rubber gloves or plastic sleeve for applying the DMSO

To Make a Poultice or Sweat Past

- _____ Poultice powder (Jen-Sal)
- _____ $\frac{1}{4}$ lb. furacin ointment, 2 oz. epsom salts, 2 oz. oil of wintergreen

Treating Cuts and Wounds

Wounds Requiring Suturing

(Wash with hose or by squeezing water from a clean sponge. Do not use anything other than water to clean or treat wound. Apply pressure, if necessary, to stop bleeding.)

- _____ Clean bucket and fresh sponge for washing
- _____ Sterile gauze squares and gauze wrap for pressure bandage
- _____ Cottons and Vetrap or flannels and masking tape to cover gauze

Wounds Not Requiring Suturing

- _____ Bottle of surgical scrub solution (Betadine or Nalvasan)
- _____ Sterile sponges for washing wound
- _____ Furacin antibiotic ointment or gauze pads soaked in furacin
- _____ Topical sprays for superficial wounds such as:
 - Topazone for antibacterial action
 - Scarlet oil spray for keeping wound clean and covered while repelling flies
 - Gentian violet antiseptic spray for drying wound
 - Granulex—for cleaning chronic wounds

Other Items Sure to Come in Handy

- _____ Twitch
- _____ Acepromazine or Rompun (injectable tranquilizer)
- _____ Sterile needle and syringe
- _____ Alcohol and sterile cotton for cleaning skin before giving shot
- _____ Neck cradle to prevent horse from tearing bandages, worrying open wound, etc.
- _____ Karo syrup to make powdered oral medication more palatable—and harder to spit out
- _____ Large plastic syringe with hole enlarged for dosing Karo mixture
- _____ Scissors
- _____ Tetanus Toxoid
- _____ Antibiotic (penicillin, ampicillin, sulfa)
- _____ Dressing, forceps or tweezers

If the horse is visibly upset or violent, find out what is troubling him. He may be struggling to free himself from wire or another entanglement; or he may be in pain. If the horse exhibits violent actions and yet is no longer trapped, then you should determine if the leg is disabled or if there is massive blood loss. Does he have colic and has he injured himself secondary to rolling or thrashing about? If the horse is bleeding uncontrollably, you should first attempt to stop the bleeding by direct pressure on the wound. Next look for wounds, bumps, legs that bend in the wrong direction, foreign objects protruding from the skin.

If there are no abnormalities in gait such as those seen with fracture or cut tendons or ligaments, the horse can be gently led to a clean working area with good lighting. If this movement causes the wound to bleed or causes the horse great distress, then movement should stop. After he is moved he should be calmed down with an offer of water or hay. Before you attempt to do any treatment you must first gain the cooperation of the horse to prevent further injury. It is important to restrain the horse well before any treatment is rendered. A tranquilizer such as acepromazine (one cc per 300 lbs) can be given intramuscularly to take the edge off. A twitch may be used as an alternative to tranquilization. It is best not to tie the horse when treating a wound, but have an assistant hold him in case he struggles.

If all systems appear stable it is time to evaluate the wound. Gently remove anything in the area that obstructs the view. Take a clean pair of scissors and trim the hair around the wound edges. Carefully observe the depth of the wound.

Each wound presents a different picture depending on the type of wound (laceration, abrasion, puncture); depth of wound (superficial or full thickness) and location. All of these factors must be taken into account and combined with the horseman's own knowledge of wound care to determine whether to continue treatment or get professional help. Any wound heals best if it can be sutured. This is especially true for full thickness wounds on the head and limbs below the forearm and gaskin (Figure 1). If the wound has penetrated the skin over a joint or tendon sheath, this presents a true veterinary emergency. It is important to determine how recently the injury occurred. A simple wound that is not disabling can be easily taken care of by the horseman. If any of the complicating signs such as thin honey-like discharge over a joint or tendon, off colored pus, or denuded bone or tendon are present, then you are in trouble and need help.

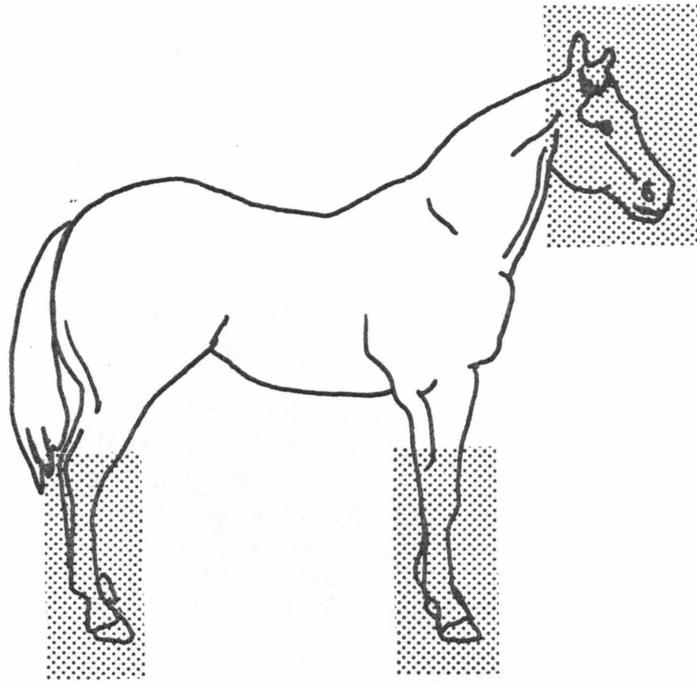


Figure 1. Lacerations completely through the skin on the head and lower limbs usually require suturing to heal in a satisfactory manner.

Next you need to determine if the wound can be bandaged or not. Wounds on the limbs that are in the same direction as the hair (verticle) may be brought together by bandaging. Horizontal wounds don't respond well to bandaging and need another form of support, i.e., sutures or a cast.

The next step in the process of wound care is to clean it thoroughly. A water hose and a mild soapy sponge can be used for this. The wound should be washed until you are certain the wound is thoroughly cleansed. Keep your eyes open for foreign material such as straw, paint flakes or bits of wood or glass which may surface during the cleansing process.

Assuming the wound is clean and you have not discovered any deeply embedded foreign objects, bone, joint or tendon, you may proceed. Dry the area with a clean towel. Never use an irritating substance such as household detergent, tincture of iodine, creolin, copper sulfate, activated charcoal or clorox in a wound. These substances prolong the healing process. You may want to dress the wound with an antibacterial ointment such as furacin, using only enough to cover the wound. The

limb should be wrapped starting with a non-stick surgical bandage to cover the wound. Additional sterile 4 x 4 gauze pads may be used to absorb drainage or pack a bleeding area. If the injury is below the knee on the front leg or hock on the rear, apply a cotton or combination bandage plus elastic tape or a flannel or cotton wrap. Gentle tugging at the skin edges will help you determine in which direction to pull the bandage. Never bandage in a direction that would tend to pull open the skin flaps.

If the wound is above the knees or hock, a stack wrap may be necessary to prevent the bandage from slipping down on the limb. It is important to keep pressure off of the bony prominences on the back and inside of the knee and hock to prevent skin damage.

Stall rest is recommended until the wound is healed. The bandage should be changed as often as it is visibly wet or every third day. Undress the wound as carefully as you dress it. The wound should be evaluated for swelling and odor and the horse's disability and attitude should steadily improve. Unhealthy pus is watery, lumpy or very thick and foul-smelling. The wound edges may turn a greenish-black. This could signal a serious infection that requires veterinary attention.

If the animal is handled in a calming manner and the wound evaluated, cleaned and dressed properly, it should heal without complication. If healing is not proceeding rapidly, then the wound should be evaluated by a more experienced individual to determine why.

Fractures and disabling injuries such as open joints or cut tendons need to be dealt with in a different way. If after the initial examination one of these problems is suspected, the horse should not be moved until trained veterinary help has arrived. It is advisable to give your veterinarian as much information over the phone as possible so that he can determine if any special equipment such as casting material, splints or a sling will be required.

If an animal has to be transported, it is important that the limb be splinted to prevent more damage to the injured part.

In the past 10-15 years many advances in the treatment of fractures involving the equine limbs have been made. The outcome of an orthopedic endeavor is dependent upon many factors, but the most important are; the amount of contamination or dirt in the wound, the amount of tissue damaged and the type of fracture present. These three factors are out of the hands of the veterinary surgeon, but are dependent to a great extent upon the first aid offered the animal. It is important to immediately evaluate the situation and temporarily immobilize the fracture before the animal is moved to an appropriate area for x-rays or treatment.

A simple field splint utilizing polyvinyl chloride (PCV) pipe and large quick release radiator hose clamps can be used to support a mechanical injury such as fracture, dislocation or tendon laceration.

The materials needed for a PCV pipe splint are:

- a. three lengths of 4" diameter PCV pipe, split longitudinally into 1/3 diameter sections,
- b. six large quick release worm drive radiator hose clamps,
- c. three one pound rolls of cotton,
- d. six cotton or gauze leg wraps,
- e. 8" long 2" x 4" wooden block,
- f. a hand saw to cut the pipe,
- g. screw driver.

After the limb has been splinted the animal should be supported under the chest both while walking and when being trailered. A trailer sling can be constructed from 1/2" diameter rope. If the injury involves a front leg, it is advisable to transport the horse facing the rear of the trailer if possible. This will prevent him from having to catch himself with the injured leg should a sudden stop be necessary (Figure 2).

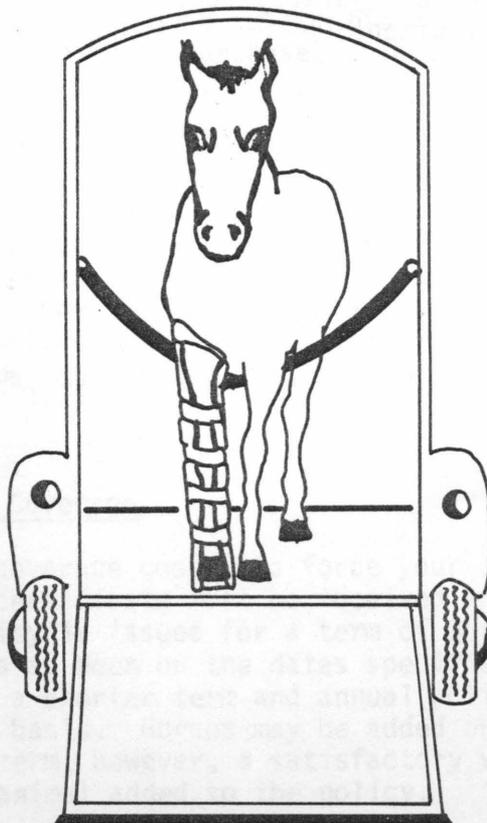


Figure 2. The proper method of transporting a horse with a severely injured front limb. The limb is splinted, horse facing the rear and a support rope or sling placed under the chest.

Not all acute debilitating injuries dictate this type of care. Actual sprains and strains that cause a limb to be tender and swollen are common. These should respond well to cold water or ice pack therapy early. This should be combined with rest and antiinflammatory drugs such as phenylbutazone or Banamine. After the heat is out of the area, poltice packs or sweats will help remove the swelling and speed up the healing process. Commercial poltice powder or Denver mud is available, but I have found that a sweat consisting of 3/4 lb of furacin ointment, 2 oz of oil of Wintergreen and 2 oz of epsom salts works the best. This paste is applied to the swollen area, covered with a plastic wrap and a cotton leg wrap. The sweat should be changed daily to prevent injury to the hair.

Tetanus prevention should be considered any time an injury is encountered. It is advisable to vaccinate annually with tetanus toxoid. Only if there is a question about the horse's vaccination status should antitoxin be used.

Mother nature designed the horse to survive in the wild. As man has domesticated this fast roaming animal with the instinct to run when danger comes near, he must also accept the responsibility to provide him with a safe environment. Equine first aid is often necessary, but all too often, the injury is preventable. Depart from here with a commitment to improve your horsemanship and decrease the number and severity of horse injuries. Let's make sure we don't have to perform first aid very often!

DW13



WHAT YOU SHOULD KNOW ABOUT HORSE INSURANCE

by

Bob Burnett

Rhulen Agency, Inc.

P. O. Box 213, Greer, SC 29651

Fine Horses Are A Valuable Asset

The need for this type of insurance is created by the financial interest that an owner has in an animal from the moment it is born or acquired. The raising, training, showing and breeding of animals represent a considerable financial investment which can be lost by death.

Insurance Valuation

The insurable value of your horse is its purchase price and money invested in training. At the option of Rhulen Agency, Inc. it may be increased to cover transportation from point of purchase to your farm. It may be further increased in value as its prize winnings, performance, race earnings and value of its offspring justify the increases. Speculative, sentimental, replacement cost and loss of profits are not part of insurable value. Requests for increases in value must be accompanied by substantiation information and a veterinarian certificate. An offer of purchase, unless accepted, is not sufficient to prove an increase in value.

Applications

Livestock mortality insurance is a form of term life insurance so any horse to be insured must be sound and in good health on the effective date of the policies. A veterinarian health certificate attesting to the horse's condition must always be submitted with the application. In addition, the application includes the name, age, type, use, sex and registration number of the horse.

Effective Date of Insurance Coverage

Before your insurance coverage goes into force your completed application together with a veterinary certificate must be received and approved by the Rhulen Agency, Inc. No policy is issued for a term of more than one year. It attaches at Noon and expires at Noon on the dates specified in the policy. Policies may be written for a shorter term and annual policies cancelled by the insured are on a short rate basis. Horses may be added or deleted from existing policies during the policy term, however, a satisfactory veterinary certificate must be submitted for each animal added to the policy.

Renewal of Insurance

The Rhulen Agency, Inc. will notify you in advance of the current policy's expiration and will forward you an application at that time. Before the renewal of the insurance can be effected a new application and current veterinary certificate must be received and accepted by the Rhulen Agency, Inc. It is important, therefore, that you complete the application, obtain the necessary veterinary certificate and forward them to the Rhulen Agency, Inc. well in advance of the expiration date of the current policy so that there will be no possible lapse in your insurance protection. Animals insured for \$5000 or less now only require a renewable statement signed by the owner attesting to the animal's health.

Transfer or Assignment of Policies

Policies may not be transferred from one insured to another unless agreed to through endorsement by the Rhulen Agency, Inc., nor may coverage be switched from one animal to another unless agreed to by the company - then only if the request is accompanied by a current satisfactory veterinary certificate and application.

Notice of Sickness or Injury

The Insured shall at all times provide proper care and attention for each animal hereby insured. In the event of any illness, disease, lameness, injury, accident or physical disability whatsoever of or to an insured animal the Insured shall immediately at his own expense employ a qualified Veterinarian, to give proper care and to use every possible means to save the life of the animal. The insured shall immediately give notice to Rhulen Agency, Inc. The number to call, toll free, 24 hours a day, seven days a week, is: 800-431-1270.

Requirements in Case of Loss

A Mortality Policy covers death only. It does not cover minor injuries, depreciation in value, loss of profits, nor failure of an animal to perform the duties or requirements for which it is kept, employed or intended.

The Company Is Not Liable

For more than the amount for which the animal is insured, nor for more than its actual cash value at the time it sustained the injury or contracted the disease that caused the loss, whichever is less. THE COMPANY SHALL NOT BE LIABLE FOR:

- A. The death of any animal described herein if such animal shall be used for any purpose other than stated in the application.
- B. Death directly or indirectly caused by, happening through or in consequence of
 - (a) any surgical operation unless conducted by a qualified Veterinarian

and certified by him to have been necessitated solely by accident, disease or illness and to have been carried out in an attempt to preserve the animal's life.

- (b) inoculation, unless conducted by a qualified Veterinarian and certified by him to have been of prophylactic nature or necessitated by accident, illness or disease.
- C. Loss caused by or resulting directly or indirectly from the carelessness, neglect, abuse or willful or malicious injury by the Insured, his agent, employees, or bailees (except bailees for hire) or resulting from any fraudulent, dishonest or criminal act or omission done by or at the instigation of the Insured or any employee or any others having the care, custody or control of the animal, including independent contractors.
- D. The destruction of any animal or animals by reason of such animal or animals having contracted or been exposed to any contagious or communicable disease whether such destruction be by the order of any Government or otherwise.
- E. Confiscation or nationalization or requisition or destruction by or under the order of any government or public or local authority or any person or body having jurisdiction in the matter.
- F. Loss in respect to any animal which has been "nerved" at or above the fetlock. These horses are uninsurable.

It's Wise To Insure The Insurance

An oversight on your part can cause your insurance claim to be denied. Livestock mortality insurance policies require that the owner do two things when an insured animal becomes ill or suffers injury: (1) provide promptly the best veterinarian service available; and (2) give immediate notice to The Rhulen Agency, Inc. An ever-increasing number of death claims are delayed or denied because of failure to comply with the second half of this dual requirement.

Analysis of dozens of claims involving "late notice" reveals that the failure to comply is often unintended and inadvertent. The owner has entrusted the care of his valuable animal to a trainer or stable manager. As the owner's agents, they are obligated to perform the duty of notification. But they have not been informed as to the need of prompt notice or other provisions of the policy. The horse becomes ill, the owner is unavailable, the policy is in the safe or a drawer at home, and the prompt notice requirement is breached.

Various attempts have been made to avoid this unintended prejudice of claims. We distribute a card with each policy issued, stating in bright red ink in capitals:

Please call these notice provisions to the attention of anyone having care, custody and control of insured animal(s). Failure to comply herewith can void your loss claim.

The card sets forth The Rhulen Agency, Inc. must be notified, including telephone numbers for 24 hours, seven days a week service.

It must be conceded, however, that the distribution of the cards did not lead to more general compliance with the immediate notice provision. The card apparently was not tacked up in the stable or office, but was kept with the policy, and the flood of tardy notice cases continued.

An insured's failure to comply with the immediate notice requirement poses a serious problem for representatives of the issuing company. No one wants to deny a meritorious claim because of an unintended failure to comply with a policy provision. We know that the owner has been relying on his insurance for protection and has been paying premiums so that he may have indemnification if his valuable animal dies by accident or illness in mid-career.

Owners must realize, however, that the immediate notice provision is of great importance to the Rhulen Agency, Inc. It is likewise important to the owners, if insurance rates are to be prevented from going through the roof.

Failure to give notice in accordance with the policy provisions may be due to a non-informed trainer, breeding farm manager or, as in a recent case, to a breakdown of communications between veterinarian and owner, and not to any desire not to comply. But even an unintended failure to give notice results in prejudice to the company and in a certain number of fatalities which might have been avoided.

The livestock insurance carrier may be prepared to move in and to participate in, or take over entirely, the treatment of an ill or injured animal. The purpose of the immediate notice provision is to permit prompt examination by company veterinarians and the exercise, if deemed advisable, of the company's reserved right to assume possession and treatment of the horse in an effort to save its life and prolong its usefulness.

These rights on the part of the company are important. The level of veterinariarn practice and the availability of modern equipment varies widely from practitioner to practitioner and from area to area. Symptoms have been diagnosed as fatal "wobbler syndrome", because no X-ray machine was available to reveal hairline fractures of the rear leg. Humane destruction has been recommended where neither negative prognosis nor uncontrollable suffering was present. The Company, whose money is at stake, has a right to participate in such decisions. It cannot effectively exercise that right without prompt notice to it of illness or injury.

Livestock mortality insurance companies render a service which the racing and breeding industries need. The companies are engaged in a constant battle to keep the premium cost of their product within bounds that owners and breeders can afford to pay. Compliance with the immediate notice provision is an important factor in that battle.

Status of the Virginia Horse Breeder Incentive Program
and the Study of a Virginia Horse Center

Jim Sharp
Virginia Department of Agriculture and Consumer Services

Virginia's horse industry is a leading income generator to the Commonwealth and to agriculture. According to data gathered and summarized in a recently published inventory by the Virginia Cooperative Extension Service, Virginia's horse industry operates with an annual gross product or cash flow of \$321,981,936.00. Total investment in land, buildings, equipment, and equine in the Old Dominion totals \$697,184,741.00. The state's horse industry must annually either purchase or produce general agricultural industry products and services totalling almost fifty-five millions dollars.¹

Virginia Horse Breeder Incentive Program

Though contributing significantly each year to the economic well being of Virginia, the horse industry is currently experiencing only modest growth opportunity. Economic incentives offered by other states, but previously not offered in Virginia, encourage the movement of business and more critically, dollars out of the Old Dominion. Contrary to the situation existing elsewhere, in Virginia there has been no added economic or business incentive to breed horses in this state.

The Virginia Horse Breeder Incentive Program was created, after thorough study, by the 1981 Virginia General Assembly. To be established and administered by the Virginia Department of Agriculture and Consumer Services, this program will provide for the distribution of public funds only on a matching basis with private funds awarded by private statewide equine organizations through their futurities or other breeder incentive programs. Virginia horsemen contribute these private funds through nomination fees to their respective organizations. The private funds will not be administered by the Virginia Department of Agriculture and Consumer Services, but by the private statewide equine organizations as is now the situation. The Virginia Horse Breeder Incentive Program will apply to all breeds which meet the criteria stated in the proposed regulations.

Generally the program will work as follows:

Each statewide equine organization will receive a copy of governing regulations and guidelines from the Virginia Department of Agriculture and Consumer Services. Qualified organizations will then use this information in formulating private breeder incentive or futurity programs or in bringing their present programs into compliance.

¹ "Virginia Horse Inventory". A report of the equine census and compilation of economic estimates. November 2, 1981. Virginia Cooperative Extension Service. Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.

The qualified statewide equine organizations' programs will then be submitted to the Virginia Department of Agriculture and Consumer Services for review.

If the statewide equine organization is deemed qualified and its program is judged acceptable by the Virginia Department of Agriculture and Consumer Services, available public monies to match the private money paid directly to the breeder by the appropriate statewide equine organization will be paid directly to the winning breeder by the state.

Funding for the Virginia Horse Breeder Incentive Program was not included by the 1981 General Assembly. A request for funding was included in the Virginia Department of Agriculture and Consumer Services 1982-84 addendum budget, but was not granted. The Virginia Horse Industry has been working to have funding included by the 1982 Virginia General Assembly.

Virginia Horse Center

A joint legislative subcommittee was created by the 1980 General Assembly to study the possible establishment of a Virginia Horse Center. Most of the individuals composing this panel were also members of the joint legislative subcommittee studying breeder incentives. During 1980 this group received testimony from Virginia horsemen and groups concerning the needs and current situation of the industry. The study was continued by resolution in 1981, during which the committee explored the options available and the feasibility of the construction of such an event center. Areas of study included: site selection, availability of land currently owned by the Commonwealth, financing alternatives, possible benefit to the state directly and indirectly, and what facilities should be included.

In its report, the committee stated that a Virginia Horse Center is needed, but felt that due to the state's current fiscal situation, now is not the proper time to recommend the appropriation of state funds to build a horse center. The joint subcommittee recommended:

1. The Department of Agriculture and Consumer Services should continue to explore means of establishing a Virginia Horse Center, including siting, financing, and management arrangements.
2. This subcommittee should continue in existence in order to receive and act upon any proposal the Department is able to make.

