

# *Horse Farm Management Workbook*

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Prepared by Carolyn C. Bay  
Cooperative Extension Director  
Gladwin County

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Extension Bulletin E-2175  
Cooperative Extension Service  
Michigan State University

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October 1990  
\$2.50

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# Horse Management Workbook

Prepared by Carolyn C. Bay,  
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*Appreciation is expressed to the following for  
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# Foreword

by Ken Munson  
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While preparing this informative booklet, the author has attempted to touch on many phases of horse activity. Some parts are quite detailed while others are quite simply stated. This booklet is not intended to be comprehensive in all aspects of the horse world. The various laws, veterinary practices and certain technical data are covered in more detail in other publications.

The horse has played an integral role in world history. Today, the working phase of the horse is greatly reduced, but the horse population keeps growing because so many people love this big, gentle beast. The horse today is primarily a pleasure animal and is approached by people in various ways. Some wish to go for an occasional ride by visiting a horse rental stable, while others wish to own horses or go into the racing or breeding business. Any association with horses needs to be approached with logic and reality that tempers any starry-eyed idealism.

Though horses can give us a great deal of pleasure, a prospective horse owner needs to be well aware of the responsibility and labor involved. Too many people fail to look beyond the glory of horse ownership to the daily dedication of care this animal requires. Within a short period of time after the purchase, some owners are wondering what they have gotten themselves into and

can hardly wait to unload their problems. Others will find the ownership and pleasure derived from horses worth much more than the effort required to care for them, and a rewarding lifelong association begins.

As you begin your relationship with horses, it is extremely important to have a plan of operation so you don't just haphazardly jump into an activity that may be over your head.

This booklet can assist you by asking some very thought-provoking questions. It can give you some operating parameters and, in general, give you important guidance, whether you own a single horse or are planning a boarding or breeding business or some other type of horse activity. Look at all the facts, the harsh ones as well as the pleasurable ones, and then decide what direction you are going.

It is important that you decide whether your operation is going to be considered a hobby or a business. Though it is not our intent to influence you one way or another, it is important that you have a plan of operation. If you are business-directed, the plan should be in writing and quite detailed in explaining how your operation will get you to the profit-oriented situation you desire.

Read the booklet and then proceed. The probability is that your decision will then be made with a little more knowledge.

# *Introduction*

by Carolyn Bay

During the 1987 Governor's Conference on Horses, the equine industry was described as the "invisible industry." It is a many-faceted industry. This booklet can help you begin to analyze some parts of it. The sections chosen apply in some ways to pleasure and racing.

How useful the financial analysis will be depends on the information you supply. Accurate and complete enterprise records are necessary today to keep an operation competitive tomorrow.

The appendix section contains all the tables referred to throughout the book. Completing the workbook will help you evaluate your current situation and help you set goals for coming years.

Safety is an important part of the whole industry. For information on safety, you can refer to "Horse Sense," a series of manuals for 4-H leaders and members written by Nicholie Ashcraft, MSU agricultural and extension education specialist.



# Evaluation of the Horse Operation

Contributors: Beth Kuhn, BEK Inc., Howell; John Leech, Livingston County Extension Director; Howard Person, MSU Extension Specialist, Agricultural Engineering; Richard Dunn, MSU Extension Specialist, Animal Science.

This section has a dual purpose. It can provide guidelines for an existing horse enterprise or one being planned. It can also be used to evaluate a boarding and/or training facility.

It is divided into several sections for convenience. You may need only one or two parts.

Remember, every situation is unique and these are only guidelines to help you organize your information. Personal references and recommendations of persons who are using a facility are very important.

## BOARDING FACILITIES

### *Stable and Stall Construction*

**Q. What is the minimum size horse stall that would be considered acceptable?**

A. Normally in a boarding facility, we would consider a 10- by 10-foot stall to be the minimum size. For larger horses, 12 by 12 feet or 14 by 14 feet is recommended. Brood mare stalls, maternity stalls and stallion stalls should be 14 feet square.

**Q. What type of material should be used to build horse stalls?**

A. Stalls should be built of a material that is difficult for a horse to chew or damage. Treated 2- by 6-foot tongue-and-groove material or native cut lumber such as oak or maple is recommended. Cement block stalls are relatively expensive to construct and maintain.

**Q. What type of flooring material should be used in box stalls?**

A. The most common material is a combination of sand and clay. This provides a floor that is relatively easy to maintain and keep dry. Other acceptable materials include crushed limestone or an asphalt type of material that is well bedded. The crushed limestone and asphalt materials are easy to keep clean and maintain, but they are slightly harder on the horses' feet and legs.

**Q. Which is preferred, a box stall or a tie stall?**

A. Box stalls are preferred because of their safety and ease of maintenance.

### *Turnout*

**Q. Is turnout available? How often are horses turned out?**

A. If the facility has turnout facilities, are the horses turned out alone or in groups? Horses that are not exercised daily should have access to a turnout facility during part of each day.



**Q. What kind of fencing or shelter is best?**

A. Safe, adequate fencing is important. It should be adapted to the type of horse raised. For mares, foals and young horses, three-board wood fence is one of the preferences. Diamond-mesh fence with a sight board on top is a safe fence. Stallions need a four-board fence constructed with safe materials that will keep the animals in the area.

**Q. Should I turn my horse out individually or with a group?**

A. This depends on the facility, the type of horse that you have and the kind of work this horse is doing. If you are going to turn it out with a group, you must make sure that the horses are compatible and that they get along reasonably well. Racing and performance horses especially need to be protected from being kicked or bitten.

**Q. Should there be feed and water in the turnout area?**

A. Feed is not necessary in the turnout area, but access to clean, fresh water is important if the horse is going to be out for more than two to three hours at a time.

**Other Considerations**

**Q. What should we look for in evaluating the safety of boarding facilities?**

A. Look for good maintenance and upkeep of the facilities. Anything that might injure horses should be repaired or kept out of the way. Stalls should be free of protruding nails or broken boards that might harm the animals.

**Q. What should we look for in horse barn ventilation?**

A. The barn should be well ventilated. This means ventilators in the ends of the barn at the eaves and in the roof. The barn should have a ventilation system that provides a complete change of air three to four times an hour. Avoid a facility that is kept so tightly closed that ammonia builds up in the barn. Other indicators of poor ventilation are: moisture buildup, mold growing on walls, abundance of cobwebs and excessive coughing of horses.

**Q. What are the things to consider when looking at the lighting in a horse stable?**

A. Lighting needs to be adequate for the task at hand.

**Q. Will our horse have access to other horses in the facility?**

A. Stall partitions should be high enough so that two strange horses stabled next to each other do not have nose-to-nose contact. If the boarding facility has turnout paddocks, you need to know how the paddocks are going to be managed. Is your horse going to be turned out alone, or turned out with other horses?

**Q. Should feed boxes and hay racks be located in each stall?**

A. Yes, it is recommended that each stall have its own feed box and hay rack. Feed boxes should be solid and well made of a material that is easily maintained and cleaned. Hay racks should be the preference of the owner.

**Q. When should the stalls be cleaned?**

A. Stalls should be cleaned a minimum of once a day. Clients paying a boarding fee for their horses should expect them to be boarded in clean, dry stalls.

**STABLE NUTRITION**

**Q. What type and quality of forage and grain should be fed?**

A. Feed only bright, clean hay that is free of mold and extraneous materials. If you are feeding oats, they need to be bright, clean and free from dust. If you are feeding other types of feed materials, make sure that they are fresh and well mixed.

**Q. What storage facilities are needed for the feed?**

A. Storage needs to be adequate to keep hay and other forages out of the weather so you will not need to worry about mold developing in them. Grain storage should be constructed to keep out mice, rats and cats.

**Q. How often and at what time of the day should the horses be fed?**

A. Generally, horses should be fed a minimum of twice a day, at the same times each day.

**Q. Should water be available in each stall or paddock?**

A. Yes, water is extremely important. Clean, fresh water is one of the cheapest nutrients we can give to horses. This is extremely important if they are watered from buckets. The buckets should be emptied and cleaned periodically so the horses have a clean source of fresh water at all times.



**Q. Should stables administer special supplements or medications?**

A. At a boarding facility, no one should administer any special supplements or medications unless the owner supplies them. They should be fed at recommended levels.

**Q. How do the other horses look?**

A. This is one of the most important things to consider when you are in the stable choosing a boarding facility. Look over the other horses in the stable to see if they all look well fed and healthy and have bright hair coats. Look at the general condition of the stalls to see how the operators are maintaining their facility.

## GENERAL HORSE CARE

**Q. Should a person be on the premises at all times?**

A. Yes. One of the things you should look for in a boarding facility is on-the-farm supervision of the animals at all times.

**Q. Can you request special care for your horse (ex., a blanket or a special wrapping)?**

A. Yes, you can request these things, but in many boarding facilities you will pay extra for this type of service.

**Q. Are the horses groomed regularly, and can I have my tack cleaned?**

A. Normally at a boarding facility, the owners are responsible for grooming their own horses, and cleaning their own tack.

**Q. Are the persons caring for the horses experienced?**

A. You should make sure that at least one experienced horse person is on the premises at all times.

**Q. Is a veterinarian on call at the stable?**

A. Most farms will have a veterinarian on call, but it will still be up to individual owners to contact their veterinarians for regular horse care and other special work that needs to be done.

**Q. Is a farrier available?**

A. Again, most farms will have a regular farrier, but it is up to the individual horse owner to decide when and how often his or her horse's feet should be worked and what farrier should do this.

**Q. Am I charged for farrier care, or is it part of my board bill?**

A. Generally, this is a separate expense, like veterinarian expenses, over and above the board bill.

**Q. Are any special tests or vaccinations required at boarding stables?**

A. In most cases, a boarding facility will ask that horses come in with, at minimum, a Coggins test and a health exam.

## GENERAL FACILITIES

**Q. What kind of area is available for me to use to ride or drive my horse?**

A. Generally, in the better boarding facilities, you will have access to both an inside and an outside arena so you can utilize your horse to the maximum all year round.

**Q. Should the riding arena have an observation lounge?**

A. In boarding facilities, it is convenient to have a place for the parents of young people who are riding or others interested in watching activities in the arena to have an observation area that is warm and comfortable. Arenas should have hot water available for washing the horses and cleaning the tack. A public facility is required by law to have restroom facilities for those using the facility.

**Q. Is there a separate place to keep tack?**

A. Most boarding facilities will have tackrooms and other facilities that can be secured by locking.

**Q. Does the facility have fire extinguishers and smoke alarms?**

A. Most fire insurance companies require that fire extinguishers be available, at least. Many times, however, smoke alarms will not work adequately under barn conditions. If smoke alarms are present, the owners of the facility need to be sure that they are in working order.

**Q. What size aisles are required in a stable?**

A. The aisles in the barn should be a minimum of 8 feet wide up to 14 feet. The width depends on the kind of horses housed in the barn and the way the equipment is stored. Wide aislesways are frequently seen in facilities that board Standardbred horses.

**Q. Is there an area in the barn to tie the horses?**

A. Normally, animals are cross-tied in their stalls. Some boarding facilities allow cross-tying in the alleyway, but this can lead to other problems.



**Q. Does the facility have schooling horses?**

A. Generally, you select a facility for one of the following purposes: riding lessons, training and schooling horses, or open riding.

**Q. Is there a variety of experience among the boarders?**

A. It is important to find out what kind of experience the boarders have and whether they have both saddle-seat and hunter-jumper experience. Hunter-jumper riders take more equipment in an arena than saddle-seat riders. A lot of confusion can occur if the two types of riding are carried on at the same facility.

**Q. Is there a schedule for use of the exercise area?**

A. There should be a schedule for use of the exercise area, and rules on how many people are allowed in the exercise area at any one time.

**Q. Does the facility have special barn hours?**

A. Most boarding facilities have hours during which they expect people to be there. For example, they may open at 8 a.m. and close at 7 p.m. Boarders should check the barn hours and observe them — they cannot expect the person owning the facility to be there for supervision all hours of the day.

**Q. Are there limitations on time for using the facility because of lessons, training, clinics or shows?**

A. The more these occur, the fewer the open hours available for you to ride your horse.

**Q. Is the facility accessible, and is adequate parking available?**

A. It is extremely important, especially in cold weather, to have adequate parking and accessibility to the parking area.

**Q. Can I park my trailer at the boarding facility?**

A. The boarding facility should have an out-of-the-way parking area where trailers or trucks can be parked without restricting the normal flow of traffic.

**Q. Is hauling available to transport my horse to shows?**

A. Often, hauling is an additional-cost service offered by some boarding farms.

**Q. Are the barn rules posted?**

A. Rules should be posted where they are visible to all patrons and visitors.

**Q. How long has the boarding stable been in business?**

A. The length of time that a farm has been in business is not always an indicator of how good the farm is. You need to check the quality of the management and the quality of the people operating the farm.

**Q. Should I ask for references?**

A. Yes, check with people boarding at the farm to see how well they are treated and how well their horses are cared for.

**Q. What kind of insurance does the facility have?**

A. Most farms carry some kind of liability insurance, but many boarding establishments require the owners of the horses at the stable to carry liability insurance on their own horses.

## TRAINING AND/OR INSTRUCTION

**Q. Is training or instruction available?**

A. Many boarding facilities will not even have a trainer. If a trainer or riding instructor is present, you need to check with the people in the program to see if he or she is capable of doing the job expected.

**Q. Is there a cost for lessons?**

A. At most stables, you pay an added cost for any training or riding lessons given unless they are in conjunction with the purchase of a horse.

**Q. If horses are being schooled, how often should they be ridden or driven?**

A. If you are paying for training, or schooling, on a daily basis, you should expect your horse to be worked at least six out of seven days per week.

**Q. Should I ask what training aids are used?**

A. Yes. If a horse goes to a professional trainer, he or she may be using some aids that may not be visible to the people having their horses trained.

**Q. Can I as an owner observe the training?**

A. Yes. In most cases, reputable trainers will not have a problem with your coming in and observing your horse being worked or trained.

**Q. Can I handle my horse at the stable without the trainer or supervisor being present?**

A. Normally, most farms involved in training do not allow this. Once the horse has been turned over to the farm, it is the trainer or supervisor's responsibility to make sure that the horse is handled properly so that someone doesn't get injured.



**Q. Will a trainer work with me to show me how to handle my horse?**

A. Yes. In most cases, if you take your horse to a trainer and you expect it to come back to you, the trainer will provide this service. The trainer will usually work with you once the horse is under your care again to show you what to do and how to handle your horse.

**Q. What is the standard cost of boarding or having your horse trained?**

A. Generally, there is no standard cost. We find that the cost varies greatly, depending on the area, the popularity of the person training the horse, and the boarding stable and the kinds of services it provides.

## NUTRITION

**Q. What kinds of feeds are fed to the animals at the stable?**

A. You will need to check on this. Is the hay first, second or third cutting? What is the quality of hay being fed? Are individual grains such as oats and corn being fed, or is the stable feeding a sweet feed or a pelleted feed?

**Q. What is the minimum quality of the hay that is fed at the stable?**

A. Standards for hay quality:

1. 10 to 12 percent protein
2. Clean and bright
3. Free from mold and excessive dust

**Q. Should the horses at the stable be fed a ration that contains only hay?**

A. Yes, if the horses are idle most of the time, a ration made up of high quality hay, fed at the rate of about 2 percent of the body weight of the horse per day, would be an adequate ration.

**Q. What should I look for in the grain ration fed to the horse?**

A. The ration can include a variety of grains, with the most commonly fed being oats, corn and barley. These should be fed on a weight basis rather than on a volume basis, but they can be interchanged, if desired. The horses can also be fed a complete sweet feed or pelleted ration.

**Q. Can we feed the same ration to all ages of horses?**

A. Yes, generally the same ration can be fed to all ages of horses. The amount should be regulated, however, so that each is getting the proper amount of protein for its development and growth.

**Q. Should the rations be balanced for the age of the horse and its workload?**

A. You should check to see that the stable is feeding balanced rations, and that the amounts being fed are based on the workload and condition of the horses being fed.

**Q. Are the forages being fed at the stable being tested?**

A. Forage testing is relatively new in the horse business, but it is good to test to determine the actual quality of the forages being fed rather than just guessing at the quality based on the color, lack of weeds, and freedom from dust and dirt.

**Q. Is there one best kind of hay to feed to horses?**

A. No, but it is important to feed the best quality hay you can. The price paid for the hay should be in line with the quality of the product.

**Q. Should straight alfalfa hay be fed to horses?**

A. Straight alfalfa hay can be fed to horses, but it must be fed more carefully than some other types of hays and combination hays to avoid digestive problems. By taking some time and gradually switching the horses to it, you can feed straight alfalfa, but the average horse owner would probably be more successful feeding a combination of alfalfa and grass hay.

**Q. Should I feed dusty or moldy hay?**

A. No. In feeding horses, one of the most important things to consider is that all hay fed is free from dust and mold. Horses, because of the design of their digestive system, have more trouble tolerating dust and mold than some other farm animals.

**Q. Is there one hay or grain ration that is safer to feed to horses than others?**

A. Yes. In general, if you are working with a novice with limited experience feeding horses, it is best to suggest a hay mixture that has a fairly high percentage of grass, and a grain ration that contains straight oats and a vitamin/mineral supplement.

**Q. Do horses need salt in their diet?**

A. Yes, all horses need a salt supplement. It is best if it is given in the form of free salt so the horse can regulate the amount it needs for body functions.

**Q. Should I feed a vitamin/mineral supplement?**

A. In general, for most of our rations on horse farms, we should consider adding some dicalcium phosphate or another calcium/phosphorus supplement. Because of the ratio of grain to hay that we are feeding in our rations, some imbalances may occur that



may cause some problems with proper bone and muscle development.

**Q. Should a vitamin/mineral supplement be routinely fed to the horses?**

A. If the boarding stable operators have carefully checked to see if they are feeding balanced rations, they may not be adding any supplements. If the ration is not being checked, they will probably be providing a vitamin/mineral supplement.

**Q. Should I add selenium to the ration?**

A. Michigan is a selenium-deficient area, and in most cases you will need to add selenium to the ration. Only a small amount is required, so rations should be carefully formulated and mixed.

**Q. Can I overfeed protein to my horses?**

A. Overfeeding protein affects different types of horses differently. Pleasure horses tend to gain too much fat if they are fed a ration containing too much protein. Some performance horses have muscle problems that are blamed on feeding too much protein.

**Q. Is it possible to feed too much concentrate and not enough hay to my horse?**

A. Yes, hay and concentrates are usually fed in a ratio that depends on the age of the horse.

**Q. Should I feed the animal at a regular time each day?**

A. Yes, it is normally suggested that horses be fed a minimum of twice a day at approximately the same times each morning and evening.

**Q. Will pasture provide adequate nutrition for my horse?**

A. Yes. Well fertilized and maintained pasture is adequate diet for a horse that is idle or doing only light work.

**Q. Is there a relationship between grain, forage and exercise?**

A. Yes, to maintain proper body growth, the more exercise that a young horse gets, generally, the more grain you will have to feed, and the smaller the amount of hay or forage required to provide the proper body development, as well as bone and muscle development.

# General Equine Herd Health

Contributor: Dr. Kenneth Gallagher, DVM, MSU Large Animal Clinical Sciences.

## **Q. Are you on a herd health program?**

A. Every horse should be on a herd health program. Preventive medicine is much more productive and effective than trying to take care of problems after they arise. You are always going to have a certain number of emergency or crisis problems, but overall it is much better to set up a program and follow it properly so that you can prevent as many of the problems as possible. It is also imperative that you work closely with a doctor of veterinary medicine, or DVM.

## **Q. Do you consult your local veterinarian on herd health programs?**

A. Work closely with the veterinarian setting up the herd health program. Such factors as numbers of horses on the farm, the acreage, and how many horses of different ages classes all have a bearing on the type of management program. If you have the program set up properly, you should have a herd health or medical record folder on each individual animal with all the appropriate background information on age, sex, etc., and also baseline values (temperature, respiratory rates) and a chronological history of how that animal has been cared for. Sections of the health record may cover other aspects of herd health care, such as farrier work, dental work, etc. Specialized records should be kept for broodmares to record reproductive cycles. A veterinarian can just glance at this and know the treatment history and how the animal can best be treated in an emergency.

## **Q. Do you have a basic vaccination schedule?**

A. It is imperative that you have a complete and effective vaccination program. We cannot depend on natural exposure to disease to build up immunity.

Discuss this program with your veterinarian and design a plan for your operation. Factors such as what you do with your horses — ex., do you take them to shows in the summer? Do you go to racetracks? — all bear directly on not only which diseases you should vaccinate against, but also how frequently you should vaccinate and the time intervals between booster vaccines.

## **Q. Do you have your horses vaccinated against the common equine diseases?**

A. Horses should be vaccinated against several common diseases. Number one should be tetanus, because of the horse's susceptibility to it and because of the relatively high mortality rate for horses that have not been vaccinated against it. You should use the tetanus toxoid form of the vaccine, which is more effective and longer lasting than the tetanus antitoxin.

The second common equine disease against which a horse should be vaccinated is equine influenza. This is the most common respiratory disease of horses in Michigan.

## **Q. Are there some less common diseases that you should consider vaccinating against?**

A. Yes. These include:

- Strangles
- Eastern equine encephalomyelitis, or EEE (also known as sleeping sickness)
- Rabies
- Leptospirosis

Horses may require protection against other diseases, depending on the types of horses you have or what activities they participate in.

Rhinopneumonitis is a viral, respiratory-type disease, though it is a little more complicated because it has effects on reproduction as well as respiratory effects. To prevent abortions that can happen because of this virus, broodmares must be vaccinated differently than horses that are being protected against just the respiratory phase of this disease. This one is very important to discuss with your veterinarian because the broodmare requires a fairly complicated vaccination schedule.

## **Q. Are there any new diseases in Michigan?**

A. A new disease in Michigan is Potomac horse fever. This is caused by a Rickettsia organism, which is different from a bacterium or a virus. We are recognizing cases in Michigan, and the disease appears to be on the increase, so on individual farms in certain areas, veterinarians are recommending that horses be vaccinated against it.



**Q. Should you have a parasite control program?**

A. Internal parasites are the single biggest health problem in horses. We distinguish between two types of parasites in horses: the external, meaning flies, mosquitos, etc.; and the internal, which refer to the worms or other parasites that get inside the horse and cause internal damage. Appendix B in the back of this workbook gives more information on parasite control.

**Q. Can colic be caused by internal parasite damage?**

A. Yes, research and clinical cases show that many of the colic problems or the intestinal diseases such as impactions or twisting of the intestine (which can cause a very severe type of colic) are caused directly or indirectly by parasites.

**Q. Do you have a schedule for parasite control?**

A. Parasite control should be tailored to your particular operation. Factors to be considered are acreage, age of the horses, and opportunity for pasture rotation. It is important to keep a record of the products that you use on your animals so that if an emergency arises and a veterinarian has to give them medication, he/she will be able to determine whether it is compatible with the worm medicine that was given.

**Q. What damage do internal parasites cause in horses?**

A. The most serious is colic. We know through research and clinic cases that many of the colic problems or the intestinal diseases such as impactions or

twisting of the intestine are caused indirectly by parasites.

**Q. Is colic a serious problem in the horse industry?**

A. Colic is the number one killer of horses. It can manifest itself in many forms. In horse people's terminology, colic is considered a disease, though in actuality, it is only a symptom. It usually involves the intestinal tract of the horse, although it could be related to other organs of the body, such as kidneys, ovaries, etc. The more common types are: 1) gas colics where an excess amount of gas builds up in the intestines, causing stretching of the intestine and pain; 2) the impaction type, which is a form of constipation that occurs when the intestine gets blocked with fecal material; and, 3) twisting or torsion of the intestine, which is the most severe form of colic.

**Q. Should you have a schedule for hoof care?**

A. Yes, hoof care should be part of your herd health program. If you are raising foals, their feet should be examined by a farrier starting at age 2 months. Many developmental problems, such as crookedness of legs and abnormalities of the hoof can be corrected with attention at an early age. Adult horses should have their feet checked by a farrier every 8 weeks unless they are not shod and are on pasture. Under natural conditions, most horses will keep their feet worn down.

Horses performing in special activities will need very individual attention from the farrier.

See Appendix D at the back of this workbook for more information on foot problems.

# Reproduction

Contributors: Dr. Carla Carleton, DVM, MSU Large Animal Clinical Sciences;  
Dr. Andrew Schmidt, DVM, Lake Country Equine Center, Oconomowoc, WI.

Regardless of whether you have one mare or a herd, information on reproduction is very important. Because many of the statements here refer to the health of your animals, be aware that your local veterinarian should be your source for specific recommendations.

**Q. What is the recommended vaccination schedule to prevent rhinopneumonitis abortion in the pregnant mare?**

A. The recommended vaccination schedule for the pregnant mare calls for vaccinations at three, five, seven and nine months of gestation with a killed virus vaccine.

**Q. What vaccine(s) is(are) approved for preventing rhinopneumonitis abortion in mares?**

A. The only approved rhinopneumonitis vaccine for prevention of abortion in mares is Pneumabort-K (Ft. Dodge), a killed virus vaccine. (In contrast, Rhinomune [Norden] is a modified live virus vaccine.)

**Q. Colostrum is the essential first milk for the newborn foal. What vaccinations would boost the late pregnant mare's colostral antibodies?**

A. Thirty days before the mare's due date, give her a booster with either tetanus toxoid alone or in combination with a four-way vaccination (eastern and western encephalitis, influenza and tetanus toxoid).

**Q. If I live in a Vitamin E/selenium-deficient area such as Michigan, is it sufficient to feed my pregnant mare a selenium supplement?**

A. It may be sufficient, but if a problem with white muscle disease or other selenium-associated prob-

lems in neonatal or newborn foals has been diagnosed on the farm, then it may be advisable to consider injecting the mare with E/selenium one month before the foal is due.

**Q. Is Vitamin E/selenium necessary for the foal?**

A. In areas of the country that are deficient in Vitamin E/selenium such as the Great Lakes area, we recommend a Vitamin E/selenium injection for the foal at birth.

*NOTE: See Appendix A for a list of vaccination schedules.*

**Q. What vaccination schedule is appropriate for the stallion?**

A. The optimum vaccination schedule for the stallion would include Rhinomune and influenza at two-month intervals, with an annual four-way that includes eastern and western encephalitis and tetanus toxoid. Equine viral arteritis vaccine, strangles and Potomac horse fever vaccines may also be appropriate if these diseases have been detected in your area, or if your horses come in contact with a lot of outside horses (showing, racing, breeding).

**Q. What is the minimum vaccination schedule for foals?**

A. If the mare has not had tetanus vaccination before foaling, then it is essential that the foal receive a tetanus toxoid vaccination at birth. Even if the mare did receive tetanus toxoid 30 days before her due date,



we still recommend that the foal receive tetanus toxoid at birth. Further vaccinations of the foal would be: rhinopneumonitis, influenza and tetanus toxoid at 2 and 4 months of age, and continuing rhino and influenza boosters every two months until 1 year of age.

**Q. Why should owners record gestation lengths (number of days from breeding until parturition) from year to year on each mare?**

A. Recording breeding dates and foaling dates allows accurate calculation of gestation lengths. Individual mares tend to have a consistent gestation length from year to year—some as short as 10 months, others as long as 11 to 12 months. Records allow better evaluation/estimation of due dates, determining when to begin the closer, night-time observation of the late pregnant mare.

**Q. How long is a mare's gestation period?**

A. The gestation period in the mare can actually be quite variable. Rather than memorizing a set number of days, be it 330 or 345 days, it is much better to look for signs in the mare as she approaches parturition (giving birth). For example, close to foaling (within the last week), assessing the mare's mammary development and evaluation of its secretion provide valuable information in determining when the mare will foal. Look at the relaxation of the vulvar lips and the softening of the muscles around the mare's tail head. Assessing those things will enable you to be much more accurate in deciding how close the mare is to parturition.

**Q. Why should owners maintain teasing and palpation records from year to year?**

A. Mares again tend to be consistent in estrus length (number of days in heat), preovulatory follicle size and teasing behavior. Accurate records will help to determine the optimum time to breed.

**Q. What is waxing?**

A. Waxing is the collection of dried colostrum on the very tip of the teat. It means that the mare is approaching foaling and that her mammary gland is full of colostrum. Waxing usually happens in the mare fairly close to parturition—usually within 48 hours, though it may appear as much as 5 to 7 days before foaling.

**Q. What is a Caslick's surgery and when should it be opened before foaling?**

A. Caslick's surgery is a minor surgery of the vulvar lips, suturing them together. It is usually performed in early pregnancy or right after breeding to prevent windsucking in the mare, which can be detrimental

to her uterine health and to her pregnancy. It is recommended to open up the Caslick's before foaling, but no more than 14 days ahead of the mare's due date.

**Q. What changes occur in the mammary gland prior to parturition?**

A. The mare's mammary gland can begin increasing in size as much as one month prepartum. The most significant development will be noted within the two weeks immediately preceding parturition. Gently rolling the teat between fingers and thumb, you can express a small amount of secretion from the mammary gland. The secretion in the mammary gland will change from a very watery, serum-like fluid (clear yellow) that becomes stickier the closer the mare is to term. As waxing is noted at the teat ends, the final prepartum change will be the progression from sticky yellow fluid to a smoky-gray milk. This smoky-gray milk is generally detected within 12 hours preceding parturition.

**Q. What is the appropriate time to move your mare to the foaling area or the foaling stall?**

A. Mares foaling out on the breeding farm should be shipped 30 days prior to due date so that they may become more accustomed to their surroundings and develop an antibody response to local environmental agents. These antibodies will then be present to the foal through her colostrum.

**Q. Does a mare have to foal in a stall?**

A. No. However, the stall provides an area where the mare can be observed frequently and carefully. If mares are foaling outside (pasture, paddock), the primary consideration is that they are observed regularly. The best foaling environment is clean and dry (no mud, waterholes or excessive manure).

**Q. What is the incidence of dystocia (difficult parturition) in the mare?**

A. The incidence of dystocia is approximately 5 percent. These are mares that require assistance at the time of foaling (for example, the foal may have a foot or head and neck turned back). Extremely valuable mares, or mares with histories of dystocia, would be good candidates for stall foaling rather than pasture foaling. Most mares foal between 11 p.m. and 4 a.m. Frequent checking throughout the night enables you to render assistance as soon as you detect a problem. If mares are foaling in a pasture, it may not be possible to keep track of their progress and provide assistance as soon as it is needed.



**Q. What is stage I of parturition in the mare (the first part of the birthing process)?**

A. Stage I of parturition in the mare is the preparatory time before the water bag ruptures. It is a period in which the uterus is contracting, the cervix is relaxing and the foal is being positioned for parturition.

**Q. What is the normal length of stage I of parturition, and what is the expected behavior for mares in stage I?**

A. Normally, stage I lasts anywhere from 1 to 4 hours. During this time, mares are restless. They frequently urinate, get up and then lie down, begin sweating, etc.

**Q. What is stage II of parturition?**

A. The second stage of parturition is the passage of the foal through the birth canal. It begins with the breaking of the chorioallantois (the water bag). To break her water, the mare will lie down and strain. There will be a big gush of fluid that is usually light brown or amber. At that point, you need to look at your watch and mark time. If you have not seen a leg or some part of the foal appear through the mare's vulvar lips within 10 minutes, you need to call your veterinarian.

If your veterinarian will be a while and the mare is straining unproductively, it might help to get her up and walk her.

**Q. Why would it help to get the mare up and walk her?**

A. If the foal is not in the proper position and the mare continues to strain, she can injure herself and make things worse. By getting her up and walking her slowly, you may distract her, slowing down her abdominal contractions and preventing the fetus from becoming further wedged in the birth canal before your veterinarian arrives.

**Q. What is the maximum time frame for stage II, expulsion of the fetus?**

A. The maximum time frame for the foal to be expelled entirely out of the mare should not be more than 40 minutes.

**Q. What is stage III?**

A. Stage III of parturition involves passage of the placenta (afterbirth) and involution (return to normal size) of the uterus of the mare.

**Q. What is the normal time frame for stage III?**

A. In a normal situation, the placenta should be passed by 3 hours postpartum. Involution is not complete until approximately 30 days postpartum.

**Q. How do you prepare the mare immediately before foaling?**

A. In a stall foaling, the minimal preparation is a stall with clean bedding. Straw is preferable to sand or sawdust, which may cause additional contamination of the uterus at the time of foaling. Tail-wrap the mare to minimize tail hairs contaminating the birth canal (especially if assistance is necessary). Preparation consists of washing the perineal area of the mare (the area surrounding the tail head and the back end of the mare around the area of the vulvar lips). The wash is done with cotton, a mild soap or detergent (such as Joy or Ivory) and water.

**Q. What should you do if the mare does not pass her placenta within 3 hours?**

A. The primary drug used to treat retained placenta in the mare is oxytocin. It can be administered in the muscle by the owner. The majority of mares that retain beyond 3 hours and are treated with oxytocin will pass their placentas after 1 or 2 injections of oxytocin and will require no further treatment.

**Q. What is the appropriate dose and frequency of oxytocin administration?**

A. The best way to administer oxytocin is intravenously. The dose is small, about 1 cc or 20 i.u. (international units) every other hour. Oxytocin can also be given intramuscularly in the neck at a dose of 2 cc, or 40 i.u., every 2 hours until the placenta is passed.

**Q. When do you stop giving oxytocin?**

A. Oxytocin can be given regularly at 1- or 2-hour intervals for up to 24 hours. By 4 to 5 hours, and especially beyond 12 hours, we recommend you contact your veterinarian.

**Q. Should the placenta of the mare be manually removed?**

A. Manual removal of the placenta in the horse is not recommended.

**Q. During late gestation and early lactation, do the mare's rations need to be supplemented with grain?**

A. Yes. The mare in late gestation is supporting a rapidly growing fetus. After foaling, she is lactating heavily and feeding a hungry foal, and her maintenance levels and energy requirements can double during that time. We would recommend grain supplementation during those two periods.



**Q. In the postpartum mare, colic is a serious problem. Are there any preventive measures that can decrease the incidence of postpartum colic?**

A. Yes. As you are supplementing the mare with grain in late gestation and she approaches parturition, say within 2 or 3 days, it is recommended that you taper off the amount of grain to reduce the amount of fermentable feed in her intestinal tract.

**Q. What is the immediate care for the newborn foal?**

A. The first things to look at and assess in the newborn foal are:

- Make sure that the amnion (the white sac that has been immediately surrounding the foal) is not over the nose of the foal. The amnion can pass out and still completely enclose the foal at birth, though that is not the normal circumstance. If that is indeed the case, you need to quietly enter the stall, not disturbing the mare any more than necessary, and remove the membrane from the foal's nose.
- Make sure the foal is breathing. Have towels ready so you can briskly rub the foal to stimulate respiration if necessary.

**Q. How long does the umbilical cord need to remain intact?**

A. In the past, it was thought that a significant amount of blood was transferred from the placenta to the foal at birth and that if the foal didn't receive that blood, it would be weak or abnormal. Newer studies have revealed that this is not a valid concern. Less than 100 cc of blood is transferred from the placenta to the foal after birth.

**Q. Is it necessary to manually break or tie off the umbilical cord?**

A. The best way to separate the umbilical cord is to let the mother do it as she stands or moves away from her foal. This allows for normal retraction of the umbilical arteries into the abdomen of the foal and results in the least amount of bleeding.

**Q. Should you check the palate of the foal?**

A. It is easiest to check the palate if you are present at the time of foaling (before the foal gets too strong). Just place a finger in the foal's mouth to make sure there is not a cleft present. The most common sign noted after nursing of a foal to indicate a cleft palate is the appearance of milk in the foal's nostrils.

**Q. How long does it normally take before a foal will stand?**

A. Newborn foals are generally sternal (rolled up on their chests) within about a half hour of birth. We would like them to be on their feet and maintaining their balance at 1 hour of age, but that can normally extend to 2 hours. We would like to have a foal standing unassisted by 2 hours postpartum.

**Q. How long should pass before a foal should nurse the mare?**

A. The foal should nurse the mare within 3 hours of foaling. To maximize antibody transfer and disease protection, the foal should receive colostrum before 6 hours of age. As more hours pass, fewer antibodies are able to cross the gut lining (be absorbed), and the passive protection is less.

**Q. How soon should the foal receive colostrum if the mare is not lactating or dies?**

A. The foal should receive colostrum from another source (either frozen colostrum or colostrum from another mare that has recently foaled after her own foal has been allowed to nurse) by 6 hours of age.

**Q. Is colostrum that comes from a source other than an equine origin beneficial to the new foal?**

A. No. The colostrum the foal receives should have antibodies to horse diseases to which the foal will be exposed. If you have any doubt about the amount or quality of colostrum received, have the foal's antibody level checked by 24 hours of age by your veterinarian. If the foal has a low IgG, a plasma transfusion can help correct the situation.

**Q. What is IgG?**

A. IgG is a group of antibodies that the foal absorbs from the colostrum in the early postpartum period that will be active in its bloodstream to protect against specific diseases.

**Q. What is meconium?**

A. Meconium is the first passage of stool from the foal. It has a unique color, usually dark orange or light brown. It is important to note when the foal passes its meconium.

**Q. What is the normal time frame for meconium passage?**

A. Meconium passage in the foal usually follows the foal's first nursing. If you see the foal straining to defecate for a long period of time, this may indicate that the meconium is impacted. A soapy water or mineral oil enema will assist the passage of the dry, pelleted meconium.



**Q. How often does meconium impaction actually occur?**

A. Many foals strain a bit to pass the first stool; that's of little concern. Actual meconium impaction requiring veterinary care is infrequent, occurring in less than 5 percent of foals born.

If the foal is having a problem with meconium, one enema is usually sufficient. Repeated phosphate-type enemas can be irritating.

**Q. Should tincture of iodine or Lugol's iodine be used on the foal's navel?**

A. No. Normal drainage out of the navel of the foal occurs for 1 to 2 hours after foaling, and strong iodines will cauterize and close the umbilicus and prevent this. If you feel that you need to use something on the foal's navel, a tamed iodine such as Betadine solution or a diluted solution of strong iodine will do less harm.

**Q. What is the appropriate care of the foal's umbilicus after parturition?**

A. This is an area of considerable controversy in the horse industry. Historically, the foal's umbilicus has been overtreated at the time of parturition in an attempt to cover up poor sanitation. The current belief and recommendation is to spend more time on the cleaning and preparation of the stall, both at the time of foaling and immediately after. It is much more advantageous to the foal's health to have the mare foal in a clean environment with a lot of clean straw, and to "pick the stall" immediately after foaling, than it is to administer any iodine product to the umbilicus. If it is impossible to maintain a clean stall, and if sanitation is a problem, there is one other alternative available if you will be observing parturition. (This will require frequent night checks of the late pregnant mare.) As the foal emerges from the mare's birth canal and before it comes in contact with the stall floor or bedding, wrap a sterile/clean towel around the foal's belly at the area of the umbilicus and tie or tape it gently in place for 1 to 2 hours postpartum. This will provide adequate protection of the umbilicus and prevent any umbilical infections.

**Q. What are some other pre-foaling considerations?**

A. To avoid running around at the last minute, have emergency numbers posted. Among those should be the number of your veterinarian.

Let your veterinarian know if you have a problem mare and what her anticipated date of foaling is to make sure he or she is ready or aware that foaling is imminent. You may also wish to prepare an emergency kit for foaling time. This should include a number of large, dry towels to assist in drying the foal —

especially if it is a cold winter night — and oxytocin if the mare has a history of retaining her placenta.

**Q. What equipment should you have available?**

A. For parturition, owners' kits should probably include several large, dry terry towels, a mild detergent (Joy or Ivory), a couple of plastic buckets, access to water, a roll of cotton, tail wraps, sterile lubricants and plastic palpation sleeves. If the mare is having trouble foaling and your veterinarian needs to go into the mare, preparation (tail wrap and wash) of the mare will minimize bacterial contamination of the genital tract and the incidence of uterine infections occurring after parturition.

**Q. After the afterbirth is passed, what should be done with it?**

A. The afterbirth (placenta) should be examined to make sure it is complete.

It consists of three parts: the amnion, which is white and transparent; the umbilical cord; and the chorioallantois, which is connected to the amnion by the umbilical cord. The amnion should be examined to make sure that it is transparent and thin. The umbilical cord will have some twists in it normally, but it should be examined for excessive coils or darkened areas (blood clots). The chorioallantois should be examined on both surfaces. One surface should be red and velvety, and the other surface pale pink, shiny and smooth. The chorioallantois should also be examined to make sure that the tips of both horns are present. (See the diagram of the placenta in this section).

**Q. When is the mare ready to rebreed?**

A. "Foal heat" is the mare's first estrus postpartum. It usually occurs between 7 and 14 days after foaling. A lower conception rate and a higher incidence of early abortion occurs in mares bred in foal heat. A mare is a candidate for foal heat breeding if she is in good health; if she had a normal foaling, a normal foal, no excessive vaginal discharge and no retained placenta; and if her uterus is involuting normally. Otherwise, rebreeding during foal heat is best skipped.

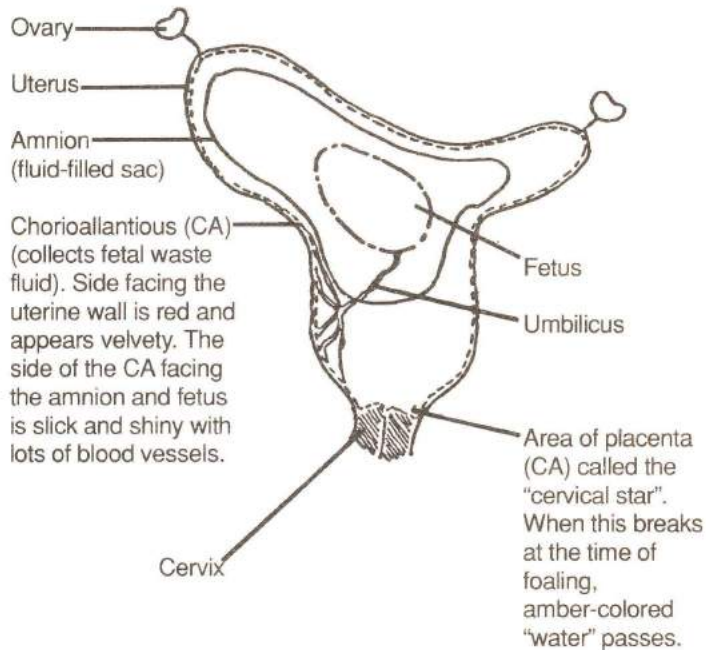
**Q. When is the optimum time to rebreed a mare?**

A. To get normal first cycle conception rates (60 to 70 percent in the mare), it is necessary to skip most mares' foal heat. A mare can be short-cycled with prostaglandins after her foal heat ovulation, or you can wait until the second heat, commonly called the 30-day heat, to rebreed. This will result in normal first-cycle conception rates.



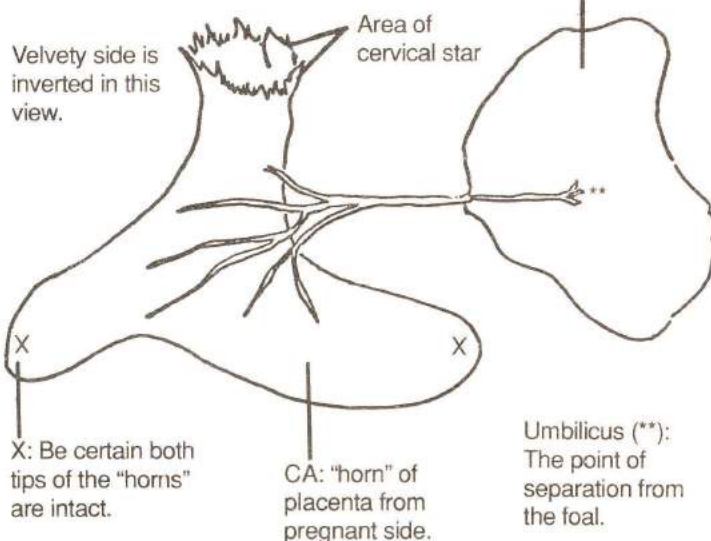
# The Equine Placenta

## A. DURING PREGNANCY



## B. PLACENTAL EXAMINATION:

Amnion: whitish, transparent membrane. May still be around the foal after it is born. Remove it from the foal's head if its nostrils are covered to prevent suffocation.



### Q. What is the normal conception rate of mares over a breeding season?

A. Taking into account all management systems, the range can be extreme—50 to 95 percent. Variables affecting conception include the breeding system (Artificial insemination (AI) or natural breeding); fertility of the stallion(s); the breeding soundness of the mares; the vaccination program; etc. As a rule of thumb, a 75 percent conception rate is necessary for a breeding farm operation to break even.

### Q. What is foal heat diarrhea?

A. Foal heat diarrhea occurs in the foal when the mare is in her foal heat. It generally is ignored if the foal has a normal temperature and normal appetite and appears bright and alert. If it continues several days beyond the time of foal heat or if the foal seems to be having problems, these foals are usually treated, but most of those foals' diarrhea abates as soon as the mares go out of heat.

### Q. What causes foal heat diarrhea?

A. The cause of foal heat diarrhea is unknown. Several possibilities have been investigated, such as the influence of the mare's milk, changes in the intestinal mucosa of the foal, and/or alterations in the bacterial multiplication within the foal's digestive tract.

### Q. How can you prevent hair loss in the back end of a foal that has diarrhea?

A. To protect the foal from excessive irritation, frequently wash the back end using a mild soap and water. Or, smear Vaseline on the back end of the foal so that the fecal matter does not stain or irritate it excessively.

### Q. How early can a mare be checked for pregnancy?

A. For veterinarians doing a lot of equine reproductive work, it is possible by manual examination (palpation of the genital tract) to detect the earliest signs of pregnancy by 16 to 20 days postovulation. Practitioners who do not do a lot of equine work will not usually feel comfortable diagnosing pregnancy in the mare before 25 to 30 days of gestation.

### Q. What is the importance of ultrasound in early pregnancy diagnosis?

A. Ultrasonography gives us visual confirmation of early pregnancy in mares that are at risk for twinning. It can determine earlier than transrectal examination alone whether the mare has twins.



**Q. Are twin pregnancies a problem in the mare?**

A. Yes. Mares that maintain twin pregnancies beyond early gestation will usually abort at 7 or 8 months gestation, delivering two dead fetuses. Abortion later in gestation can result in retained afterbirth and a sick mare. Less than 1 percent of twin pregnancies will make it to term and result in two live foals.

**Q. After the earliest pregnancy check, what subsequent checks should be done to be sure that pregnancy is being maintained in the mare?**

A. The majority (75 percent) of pregnancy loss in mares occurs by 50 days of gestation. The pregnancy checks that we recommend would be the early checks: at 16 to 20 days, and at 25 to 26 days. Ultrasound will reveal embryonic heartbeat by 25 days. Manual palpation checks suggested beyond that stage should be done at 35 to 40 days, with a last check (usually termed the "fall check") between 75 and 100 days of gestation.

A mare that has reached 100 days of gestation has a good likelihood of reaching term if she has no other uterine problems present.

**Q. What is a maiden mare?**

A. A maiden mare is a mare that has never been bred. By definition, mares bred previously as maidens that did not become pregnant are barren mares.

**Q. What is a barren mare?**

A. A barren mare is a mare that has been previously bred and is not currently pregnant. Most barren mares are detected at the fall pregnancy checks when they are found to be not in foal (NIF). Such a mare should have her uterus swabbed (cultured) to determine if a uterine infection is present.

**Q. What is a foaling mare?**

A. A foaling mare is a mare that has foaled or will foal in the current season.

**Q. What should be done before breeding a maiden mare?**

A. When a maiden mare is first brought to a breeding program, and before breeding, she should be given, at the least, a vaginal examination. A maiden mare's uterus will be sterile (no bacteria present), so a uterine culture is unnecessary, but a vaginal exam will show whether the hymen is present. If the hymen is still intact, it must be manually disrupted. This should be done no less than two weeks before the anticipated date of breeding so that this site will be healed and no additional bleeding will occur at the time of breeding.

**Q. Is vulvar conformation important in a barren mare?**

A. Yes. Poor vulvar conformation means that there is a tilting or an excessively open vulva, which can predispose a mare to a condition called pneumovagina, (also known as "windsucking"), and uterine infection. Mares that have poor vulvar conformation and are not pregnant at the end of the breeding season should be sutured (Caslick's operation).

**Q. If a mare has been sutured ("Caslicked"), when and why should she be opened?**

A. The "when" should be no less than 2 weeks prepartum. If a mare is opened more than 1 month before her due (foaling) date, it is possible that very poor (sloping) vulvar conformation could allow the uterus to become contaminated and she could develop a placentitis, compromising the foal's health. "Opening a mare" is a procedure in which the vulvar lips are injected with local anesthetic the sutured area of the vulva is cut open. There is usually sufficient time between "opening" and foaling for that area to heal. As for the "why" of opening a Caslick, the mare has potential to tear at foaling, which can cause extensive vulvar lip damage. This damage can lead to scarring and loss of elasticity of the vulvar lips and may compromise the mare's future fertility.

**Q. What is the influence of nutrition on the barren mare's fertility?**

A. Fat mares are more difficult to get in foal. Barren mares should be on a maintenance diet over the winter that does not let them get too heavy. Optimal fertility occurs in a barren mare that is gaining weight during the breeding season.

**Q. What influence does daylight have on a mare's reproductive cycle?**

A. The horse is very responsive to the length of available daylight. Horses are considered to be long-day breeders. With increasing daylight length (winter to spring), they pass from a very quiescent winter period into their period of cyclicity. The size of the mare's ovary can increase from the size of a walnut as it passes through transition (the period of unstable cycling) to almost the size of a fist. At that point, the mare establishes a normal cycle. When she is bred within 48 hours prior to ovulation, conception occurs.

**Q. What can be done to establish a mare's cycle earlier in the breeding season?**

A. To overcome the erratic cycles associated with transition in February, March and April, artificial lighting can be used. To be effective, a mare must be exposed to 16 total hours of light per day. This can be done with supplemental lighting. In a 10- by 20-foot box stall, use of a 200 watt light bulb approximately



8 feet off the floor will provide the necessary 12 to 15 footcandles at head height. The mare requires at least 60 to 90 days with this regimen to pass from winter anestrus through transition and establish a normal cycle. Starting artificial lighting by November 15 should bring the mare into an approximately normal cycle by February 15. For breeds recognizing the January 1 international birthdate, breeding can begin February 15.

See the table on page 23 for more information on artificial lighting.

**Q. Is teasing important on the breeding farm?**

A. Teasing is the cornerstone of the breeding program. It needs to be done every other day throughout the breeding season on all mares. Exceptions to that rule would be mares that are more than 40 days pregnant and mares with young foals. The latter group may not tease as well because they are more anxious and protective of their foals in the presence of the stallion.

**Q. What is teasing?**

A. Teasing is the exposure of the mare to a stallion and the evaluation of her response to his advances. A mare that teases positive (in heat) will lift her tail, passively urinate and be reluctant to move away from the stallion. A mare that is out of heat, or negative on tease, will generally rebuff the stallion with ears back, switching tail, kicking, etc.

**Q. What is the importance of foal identification?**

A. Recording early foal markings or freeze-branding foals can prevent later mixups. Mares in a large paddock may trade foals or permit more than one foal to nurse them. Later bloodtyping (if required by a breed association) may pick up this mixup. Customers may take the wrong foal home. Also, at 2 to 3 months of age, as foals shed out, their permanent markings become obvious, and these may be significantly different from early recordings of color.

**Q. Should a stallion be checked for fertility before the breeding season?**

A. Yes. Because all infertility is not associated with mare problems, it is a good idea before the breeding season to be sure that the stallion is fertile. If a stallion will be advertised and a "book" established, the exam should precede this expenditure to be certain he can cover the mares. At least by November preceding the breeding season, it is necessary to collect semen from the stallion and evaluate it not only for volume and color, but also for motility of the individ-

ual sperm, concentration (million/cc) and morphology (percent of normally shaped sperm).

**Q. Why should a breeding soundness examination (fertility evaluation) be done on a stallion?**

A. The first consideration for a horse that is already in a breeding program is to determine if he is fertile before the breeding season. But a second, almost more important, consideration is to be sure a horse that is to be used for breeding is fertile before you purchase him. If you are buying a stallion and it is impossible to get the fertility evaluation done before purchase (a buyer's expense), consider making the sale contingent on that fertility evaluation being satisfactory.

**Q. How do age and testicular size affect fertility?**

A. Generally, we like to wait until stallions are 3 years old before entering them into a breeding program. Two-year-olds, especially in the Arabian breed, are usually immature. The size of the testicle is related to the sperm production of the stallion. Stallions with small or soft testicles commonly have fertility problems.

**Q. Is there a difference among breeds in sexual maturity rate?**

A. Yes; the Arabian breed, for example, matures slower than some other breeds.

**Q. What is the influence of anabolic steroids on breeding stock?**

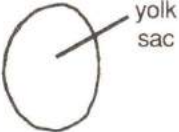
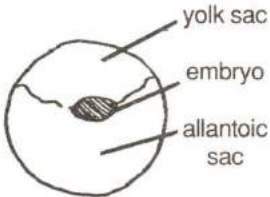
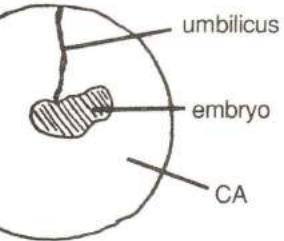
A. The influence is negative. Long-term, frequent or high doses of anabolic steroids can reduce fertility. Recovery after steroids are eliminated is variable and may require a year or more.

**Q. Are two testicles necessary for optimal fertility?**

A. Breeding stallions with one testicle (a condition called cryptorchidism) can certainly be fertile. Sperm are produced by the one descended testicle, not by the retained testicle. This particular problem is considered to be hereditary, so cryptorchid stallions should not be used as breeding stallions. Regulations in Michigan require that any stallion breeding "outside mares" (mares other than those owned by the stallion's owner) have two fully descended, normal testicles. If one testicle has been removed (after a testicular torsion, for example), the stallion is still acceptable for breeding use.



## EARLY PREGNANCY EXAMINATIONS & USE OF ULTRASONOGRAPHY

Days after ovulation	Palpation/ultrasound findings
<p>17 - 19</p>  <p style="text-align: center;"><b>18 DAYS</b></p>	<p>Only yolk sac visible. Fluid appears black on the viewing screen of the machine. It is a small sphere, 20-25 mm in diameter, like a circle in cross-section. Practitioners who do a great deal of equine reproduction work develop the palpation skills to detect signs of pregnancy at this early stage. The cervix and uterus in particular can be quite distinctive.</p>
<p>22 - 23</p>	<p>Not usually examined at this time unless an abnormality was noted at the first exam. This is the first time the embryo will be visible within the yolk sac.</p>
<p>25 - 26</p>  <p style="text-align: center;"><b>25-26 DAYS</b></p>	<p>Yolk sac regressing, chorioallantois enlarging, embryo present. Heartbeat should be present within the embryo (real-time ultrasound); total vesicle size is usually 25-33 mm in diameter. A distinctive ventral bulge should be present in the pregnant uterine horn by this time. The cervix should be closed, narrow and elongated.</p>
<p>35 - 45</p>  <p style="text-align: center;"><b>35-40 DAYS</b></p>	<p>Ultrasound is not necessary at this stage. By this stage, the umbilicus is well developed and the yolk sac regressed, the chorioallantois defined and the amnion evident (portions of the placenta). The bulge in the pregnant horn is much larger, losing its round shape, beginning to elongate.</p>
<p>75 - 100</p>	<p>Usually called the "fall check." During a transrectal palpation, the pregnant uterine horn at 90 days gestation is just about out of reach, beginning its descent into the abdominal cavity as it enlarges.</p>

**NOTE:** Most mare abortions/pregnancy losses occur by 50 days of gestation; this is the best justification for early checks. If a mare is found to be not in foal, the opportunity exists within the season to rebreed her. By the same token, if a mare is in foal at 100 days gestation, she will have a good chance of reaching term, provided she is maintained on a good vaccination program.



# ARTIFICIAL LIGHTING PROGRAM

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<b>Objectives</b>	To induce estrus earlier in the breeding season. To produce foals earlier the following year.
<b>Purpose</b>	To initiate cycling activity earlier in the year. It requires approximately 60 days for increased light to be effective. Once estral activity begins, it may require another month to establish a normal cycle.
<b>Guidelines</b>	Maintain mares under lights until they are bred and diagnosed in foal or when natural light approaches 12-14 hours per day. If a mare is placed under lights and brought into transition and the lighting program is discontinued, the mare can slip back into winter anestrus within a few days.  Use one 200 watt incandescent bulb per 12- by 12-foot stall. Other bulbs can be used as long as there are 12 to 15 footcandles of light at eye level.  <i>NOTE: Extremely cold weather can override the effects of lighting.</i>
<b>Methods</b>	<ol style="list-style-type: none"><li>1. During November, set light timer for a total of 16 hours of light. Example: Lights on at 6 a.m. and off at 8 a.m. (daylight); back on at 5 p.m. (before dark) and off at 10 p.m.</li><li>2. Increase light slowly (15 minutes per week) starting in October or November until 16 hours of total light are achieved.</li><li>3. During November, have light come on between 1 and 2 a.m. for one to two hours and then go off ("flash system").</li><li>4. Never have lights on 24 hours (this is less effective than all other systems).</li></ol>

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# *Finances*

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This section was designed to help horse owners pull together financial information on their farms to analyze business performance and work with credit institutions and government agencies such as the Cooperative Extension Service. Such information is critical if you are trying to develop a number of alternative farm plans for the future. If you need additional assistance or have questions, please call your local CES office.



# HORSE FARM INCOME STATEMENT

NAME: \_\_\_\_\_

from Jan. 1, 19\_\_\_\_

to Dec. 31, 19\_\_\_\_

## CASH FARM INCOME

1. Horse sales	_____	_____
2. Breeding fees	_____	_____
3. Board	_____	_____
4. Training	_____	_____
5. Hauling (transportation)	_____	_____
6. Judging	_____	_____
7. Commissions	_____	_____
8. Consultations	_____	_____
9. Premiums (payback)	_____	_____
10. Horse rental	_____	_____
11. Lessons	_____	_____
12. Breeders awards	_____	_____
13. Clinics	_____	_____
14. Other	_____	_____
15. Other cash farm income	_____	_____
16. Less resale items purchased	_____	_____
17. Government programs income	_____	_____
<b>18. Gross cash farm income</b> (add lines 1 thru 17)	_____	_____

## NON-CASH FARM INCOME (INVENTORY CHANGES)

<b>CHANGE IN HORSE NUMBERS</b> (beginning to end of year)		
19. Change in no. stallions	+ _____ x \$/hd _____ =	+/-
20. Change in no. mares	+ _____ x \$/hd _____ =	+/-
21. Change in no. foals	+ _____ x \$/hd _____ =	+/-
22. Change in no. geldings	+ _____ x \$/hd _____ =	+/-
23. Change in value of other livestock(\$)	_____	+/-
24. Less horse purchases made	= _____	-
<b>CHANGE IN VALUE OF STORED FEED &amp; BEDDING</b> (beginning to end of year)		
25. Change in no. bu oats	+ _____ x \$/bu _____ =	+/-
26. Change in no. bu corn	+ _____ x \$/bu _____ =	+/-
27. Change in no. bu sweet feed	+ _____ x \$/bu _____ =	+/-
28. Change in no. tons vitamins-minerals	+ _____ x \$/ton _____ =	+/-
29. Change in no. tons dry hay equiv.	+ _____ x \$/ton _____ =	+/-
30. Change in no. tons straw	+ _____ x \$/ton _____ =	+/-
31. Sawdust & shavings	+ _____ x \$/ton _____ =	+/-
32. Other bedding	+ _____ x \$/ton _____ =	+/-
33. Other	+ _____ x \$/unit _____ =	+/-
<b>34. Gross non-cash farm income</b> (sum of 19 thru 33, allow for +/-)	_____	_____
<b>35. Gross farm income</b> (18 + 34)	_____	_____



# INCOME STATEMENT: FARM EXPENSES

NAME:

from Jan. 1, 19\_\_\_\_ to Dec. 31, 19\_\_\_\_

## CASH FARM EXPENSES (for year of analysis)

- 36. Labor paid \_\_\_\_\_
- 37. Repairs, maintenance paid \_\_\_\_\_
- 38. Interest paid \_\_\_\_\_
- 39. Land and/or building rent paid \_\_\_\_\_
- 40. Feed paid \_\_\_\_\_
- 41. Seeds, plants paid \_\_\_\_\_
- 42. Fertilizer, lime, chemicals paid \_\_\_\_\_
- 43. Farrier paid \_\_\_\_\_
- 44. Trainers paid \_\_\_\_\_
- 45. Transportation \_\_\_\_\_
- 46. Breeding fees \_\_\_\_\_
- 47. Custom hire (*mowing, baling, harvesting*) \_\_\_\_\_
- 48. Veterinary fees \_\_\_\_\_
- 49. Medicine \_\_\_\_\_
- 50. Wormers \_\_\_\_\_
- 51. Vaccines \_\_\_\_\_
- 52. Gasoline, fuel, oil \_\_\_\_\_
- 53. Taxes paid (*property*) \_\_\_\_\_
- 54. Insurance (*property & livestock [mortality]*) \_\_\_\_\_
- 55. Utilities paid \_\_\_\_\_
- 56. Freight, trucking paid \_\_\_\_\_
- 57. Employee benefit paid \_\_\_\_\_
- 58. Land clearing paid \_\_\_\_\_
- 59. Marketing paid \_\_\_\_\_
- 60. Advertising paid \_\_\_\_\_
- 61. General supplies (*pitch forks, training tack*) \_\_\_\_\_
- 62. Moped, golf carts paid \_\_\_\_\_
- 63. Entry fees \_\_\_\_\_
- 64. Futurity payments \_\_\_\_\_
- 65. Stall fees \_\_\_\_\_
- 66. Lodging & travel \_\_\_\_\_
- 67. Entertainment \_\_\_\_\_
- 68. Tack, repair (*or purchase of inexpensive items*) \_\_\_\_\_
- 69. Clothing \_\_\_\_\_
- 70. Office \_\_\_\_\_

Continued on next page



71. Maintenance	
72. Equipment	
73. Furniture	
74. Memberships and subscriptions	
75. Contributions, donations	
76. Show <i>(entry fees, stall rentals, futurity payments, lodging, food, show clothes, tack, grooming supplies)</i>	
77. Racing <i>(futurity payments, feed, farrier, lodging, food, tack, training supplies, hired labor, insurance [mortality])</i>	
78. Accounts payable change*	
79. Long-term leases <i>(trucks, buildings, trailers)</i>	
80. Short-term leases <i>(horses)</i>	
81. Other	
<b>82. Total cash farm expenses (36 thru 81)</b>	

\* Accounts payable change is the increase (or decrease) in bills owed for fertilizer, fuel, repairs, taxes, feed, etc. It does not measure the changes in dollars borrowed on depreciable property. This amount recognizes input items that have been used but for which payment has not been made.

## NON-CASH FARM EXPENSES

83. Depreciation on tack, machinery, buildings <i>(not horses)</i>	
84. Change in inventory of supplies <i>(dollars) beg. to end (fertilizer, fuel, etc.)</i>	+/-
85. Other	
<b>86. Total non-cash farm expenses (83 thru 85)</b>	
<b>87. Total Farm Expenses (82 + 86)</b>	

## NET FARM INCOME

<b>88. NET FARM INCOME</b> <i>(line 35 minus line 87)</i>	
<b>89. NET NON-FARM INCOME</b> <i>(wages, etc.)</i>	
<b>90. FAMILY EXPENSES + INCOME TAXES FOR ALL FAMILIES</b> <i>(estimated)</i>	
<b>91. NET PROFIT</b> <i>(line 88 + 89, minus line 90)</i>	

# BALANCE SHEET: ASSETS

NAME: \_\_\_\_\_

Beginning of year      End of year  
Date:                      Date:

## CURRENT ASSETS

	Beginning of year	End of year
	Date:	Date:
92. Checking account balance	\$ _____	\$ _____
93. Savings account balance	_____	_____
94. CDs, stocks, bonds, etc.	_____	_____
95. Collectible accounts owed to you	_____	_____
96. Soybeans ( <i>protein</i> )                      ( _____ bu x _____ \$/bu)	_____	_____
97. Oats    ( _____ bu x _____ \$/bu)	_____	_____
98. Corn    ( _____ bu x _____ \$/bu)	_____	_____
99. Other grains                                      ( _____ bu x _____ \$/bu)	_____	_____
100. Sweet feed                                      ( _____ bu x _____ \$/bu)	_____	_____
101. Hay    ( _____ ton x _____ \$/ton)	_____	_____
102. Other crops on hand	_____	_____
103. Value of growing crops	_____	_____
104. Supplies on hand, bedding, medical ( <i>at cost</i> )	_____	_____
105. Twine, fertilizer, chemicals	_____	_____
106. Fuel	_____	_____
107. Other	_____	_____
<b>108. Total current assets (92 thru 107)</b>	_____	_____

## INTERMEDIATE ASSETS

109. Stallions                                      ( _____ no. x _____ \$/hd)	_____	_____
110. Brood mares                                      ( _____ no. x _____ \$/hd)	_____	_____
111. Other mares                                      ( _____ no. x _____ \$/hd)	_____	_____
112. Geldings                                      ( _____ no. x _____ \$/hd)	_____	_____
113. Youngstock ( <i>weanlings to age 2</i> )              ( _____ no. x _____ \$/hd)	_____	_____
114. Tack	_____	_____
115. Furniture & fixtures	_____	_____
116. Vehicles	_____	_____
117. Co-op stock ( <i>FCS, Syndicates, Partnerships</i> )	_____	_____
118. Machinery, equipment	_____	_____
119. Miscellaneous	_____	_____
<b>120. Total intermediate assets (109 thru 11)</b>	_____	_____

## FIXED ASSETS (long-term)

121. Stock ( <i>Farm Credit Services</i> )	_____	_____
122. Real estate, _____ acres, with all buildings, homes, arenas, stables and all storage fixtures	_____	_____
<b>123. Total fixed assets (121 + 122)</b>	_____	_____
<b>124. TOTAL ASSETS (108 + 120 + 123)</b>	_____	_____



# BALANCE SHEET: LIABILITIES & NET WORTH

Beginning of year      End of year

NAME: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

**CURRENT DEBTS**

125. Present amount owed on feed	_____	_____
126. Present amount owed on fuel	_____	_____
127. Balance owed on fertilizer & seed	_____	_____
128. Balance past due on taxes	_____	_____
129. Balance owed on repairs, rent, etc.	_____	_____
130. Unpaid medical/household bills	_____	_____
131. Unpaid interest due to date	_____	_____
132. Credit card balances owed	_____	_____
133. Other unpaid accounts or unsecured notes	_____	_____
<b>134. Total current debt (125 thru 133)</b>	_____	_____

**INTERMEDIATE DEBTS (due between 1 and 7 years)**

135. Debts owed to relatives	_____	_____
136. Debt balances on horses and machinery	_____	_____
137. Debt balances on cars/trucks	_____	_____
138. Other non-real estate debts	_____	_____
<b>139. Total intermediate debts (135 thru 138)</b>	_____	_____

**LONG TERM DEBTS**

140. Debts owed on real estate	_____	_____
<b>141. Total debts (134 + 139 + 140)</b>	_____	_____
<b>142. NET WORTH = (total assets - total debt) (line 124 minus line 141)</b>	_____	_____
Percent owner equity (Net worth divided by total assets [line 142 divided by line 124])	_____	_____
<b>143. Change in net worth</b>	_____	_____

# CASH FLOW SUMMARY

NAME: \_\_\_\_\_

Year \_\_\_\_\_

- Projected
- Actual

	Item	Amount
<b>■ SOURCE OF FUNDS</b>		
144.	Beginning cash balance	_____
145.	Gross cash farm income ( <i>line 18</i> )	_____
146.	Net cash non-farm income ( <i>line 89</i> )	_____
147.	New money borrowed*	_____
<b>148.</b>	<b>TOTAL CASH INFLOW</b> ( <i>144 thru 147</i> )	_____
<b>■ USE OF FUNDS</b>		
149.	Total cash farm expense ( <i>excluding interest paid — line 82 minus line 38</i> )	_____
150.	Purchases ( <i>horses, vehicles, trailers, land</i> )	_____
151.	Interest ( <i>repayment of borrowed money</i> )	_____
152.	Principal ( <i>repayment of borrowed money</i> )	_____
153.	Family expenses & income taxes for all family members ( <i>estimated</i> ) ( <i>line 90</i> )	_____
<b>154.</b>	<b>TOTAL CASH OUTFLOW</b> ( <i>149 thru 153</i> )	_____
<b>155.</b>	<b>NET CASH POSITION</b> ( <i>inflow minus outflow</i> )( <i>148 minus 154</i> )	_____

\* New money borrowed is critical in a projected cash flow, but in a summary or actual cash flow, the new money borrowed is already incorporated in other areas.



## FINANCIAL ANALYSIS

156. How many hours of lessons do you pay for per year? \_\_\_\_\_
157. How many miles do you drive for lessons per year? \_\_\_\_\_
158. How many days of judging, clinics do you pay for per year? \_\_\_\_\_
159. How many miles do you drive for clinics and judging? \_\_\_\_\_
160. How many days of in-service training do you take per year? \_\_\_\_\_
161. How many miles do you drive for this training? \_\_\_\_\_
162. How many horses do you sell per year? \_\_\_\_\_
163. What are your breeding costs per horse? \_\_\_\_\_
164. What are training costs per horse per year? \_\_\_\_\_
165. What is your purchased feed cost per horse per year? \_\_\_\_\_
166. How many acres of pasture do you have per horse? \_\_\_\_\_
167. What are your veterinary and medicine costs per horse per year? \_\_\_\_\_
168. What are your farrier costs per horse per year? \_\_\_\_\_
169. What are your advertising and marketing costs per horse per year (*training, commissions*)? \_\_\_\_\_
170. What is the cost of maintenance per horse per year? \_\_\_\_\_
171. What is your depreciation and interest cost per horse sold? \_\_\_\_\_
172. What is your debt per horse? \_\_\_\_\_

## FARM FINANCIAL ANALYSIS

173. What is your working capital?  
*(Current assets minus current debts: line 108 minus line 134)* \_\_\_\_\_
174. What is your current ratio?  
*(Current assets divided by current debts: line 110 divided by 136)* \_\_\_\_\_
175. What is your debt-to-asset ratio?  
*(Total debts divided by total assets: line 141 divided by 124)* \_\_\_\_\_
176. What is your leverage ratio, also called debt-to-equity ratio?  
*(Total debts divided by net worth: line 141 divided by line 142)* \_\_\_\_\_
177. What is your net farm income? (line 90) \_\_\_\_\_
178. What is your return on equity capital?  
*(Net farm income minus unpaid operator and family labor divided by average net worth, with the final result multiplied by 100 to get a percent.)\** \_\_\_\_\_
179. What percent of gross income is your cash farm expenses?  
*(Cash farm expense divided by gross farm income — line 82 divided by 25, with the final result multiplied by 100 to get a percent).* \_\_\_\_\_
180. What is your debt servicing percentage?  
*(Interest plus principal payments divided by gross farm income — line 151 plus 152, divided by line 35), with the final result multiplied by 100 to get a percent.* \_\_\_\_\_

\* Unpaid perator and family labor is what the farm would have paid to get someone else to do the work. (This unpaid value is NOT listed elsewhere in the financial section.)  
Average net worth is the beginning-of-the-year net worth plus the end of year net worth, divided by 2. (Use this total rather than line 144).

## FARM FINANCIAL ANALYSIS

STANDARD	COMMENTS
173. More than one month's bills	The greater the amount of capital, the more liquid the business. Larger businesses need more capital.
174. At end of December: 1.5 to 2.0	When it is 1.0, current assets are just equal to current liabilities. If above 1.0, the business is liquid. This ratio will fluctuate during the year.
175. Less than .40	A debt-to-asset ratio of .40 means you are 40 percent in debt, and your net worth is 60 percent of the assets. What is "safe" depends on a farm's earning power. A farm with high profit margins might survive a higher debt-to-asset ratio.
176. Lower is better	A leverage ratio of 1.0 means debts equal net worth. If greater than 1.0, the lender owns more of the farm than you do! What is "safe" depends on the farm and the manager's ability to manage debt.
177. Your goal	This should meet your family living needs and make you happy that you are in this business instead of another job.
178. More than 5 percent	This measures the return the farm is earning on the net worth you have invested. You should try to earn at least as much as if you had the money in a savings account. Many managers try to maximize this profit measure as one of their goals.
179. Less than 65 percent	Keep your cash expenses under 65 percent and you'll have 35 percent of income to use on principal payments, capital replacements (more horses, equipment and family living needs). NOTE: This is calculated on farm business only.
180. Less than 20 percent	This shows how much of a burden debt payments are on the farm business. The maximum "safe" level will vary from farm to farm. Those with high profit margins could survive higher percentages.



# *Appendices*

# Vaccination Schedules - Appendix A1

Horses 1 year and older will be considered adults for scheduling vaccinations. Information on mares, foals and stallions is covered in Appendix A2 of this workbook.

Special situations, such as erratic outbreaks of a given disease, heavy exposure to a variety of horses at shows or racetracks, or increased traffic into the farm or stable, will require a different vaccination schedule from the average program.

Consult your veterinarian about special situations. Clear combination vaccines (3- and 4-way products) that vaccinate against several diseases simultaneously with your veterinarian before use.

Never vaccinate a sick horse until you check with your veterinarian—severe complications can result.

This schedule is based on proper use of vaccinations (foals given the initial injections in a vaccination series) up to 1 year of age.

Type of vaccination	Suggested schedule
Tetanus toxoid	1 booster per year or when lacerated (cut) or injured.
Influenza	1 booster per year unless there is a special situation.
Rhinopneumonitis	1 booster per year unless there is a special situation. (Pregnant mares require a separate vaccination schedule.)
(EEE) Eastern equine encephalomyelitis	1 booster per year in endemic areas after initial vaccination series.
Potomac horse fever	1 booster per year after initial vaccination series in endemic areas.
Strangles	1 booster per year. This vaccine should be used only if necessary, based on past history of the horse or farm.
Equine viral arteritis	Special situation.
Rabies	Special situation.
Leptospirosis	Special situation.

*NOTE: Some vaccine products use one injection as a booster; others require a two-injection series repeated every year. Check with your veterinarian.*



# Vaccination Schedules — Appendix A2

## ■ PREGNANT MARES

Month of gestation	1	2	3	4	5	6	7	8	9	10	11
Pneumabort-K (rhinopneumonitis)			X		X		X		X		
Flu (influenza)			(X)							X	
E & W (encephalitis: Eastern & Western)			(X)							X	
Tetanus toxoid			(X)							X	
Strangles*											
Potomac horse fever (PHF)*											
E-Se (Great Lakes states)**											
Equine viral arteritis (EVA)*										X	

\* Depends on region, incidence, past history of disease.

\*\* 1 cc/100 lb of mare, ex., 10 cc/1,000-lb-mare.

(X) = optional

## ■ FOALS

Age	At birth	2 months	3 months	4 months	5 months	6 months
Rhinopneumonitis		X* - then every 2 months				
Flu		X* - then every 2 months				
E & W		X*				
Tetanus toxoid	X					
Strangles						X
Non-vaccination injection of Vitamin E-Selenium (equine product)	X**					

\* Initial four-way, booster 3 weeks later (the time when passive, colostral immunity decreases).

\*\* 1 cc/100 lb. (For Great Lakes, selenium-deficient states), most foals: 1 cc IM at birth.

## ■ BARREN & MAIDEN MARES

4-way: 1 to 2 times per year (depends on traffic, exposure to a larger population).

Rhino-pneumonitis: Rhinomune if separated from pregnant population; otherwise Pneumabort-K (more frequent administration).

Strangles: as above

PHF: as above

EVA: 3 weeks prior to breeding to a known shedding stallion if the mare has a negative titer, i.e., no prior exposure to the virus.

## ■ STALLIONS

Rhino-pneumonitis: Rhinomune 2x/year, before breeding and at the end of the season.

Flu: contained in 4-way, 2x/year, then alone at alternate two-month periods.

E & W: within 4-way, 2x/year

Tetanus toxoid: within 4-way, or once a year

Strangles: if endemic

PHF: if endemic

EVA: if endemic, prior history, outbreak on farm. One month prior to breeding season.

## ■ YEARLINGS

Assuming prior boosters as foals/weanlings, continue with 4-way 2x/year and strangles vaccine. Rhinomune 2x/year.

# Parasite Control — Appendix B

## Internal Parasites

Controlling internal parasites (worming) requires treating at certain intervals during the year with appropriate worming agents. This program should be designed in consultation with your veterinarian, who will consider:

- Number and type of horses
- Arrangement of pastures
- Traffic of horses
- Resistance of parasites to worming agents
- Use of tube worming vs. paste wormers
- Breeding program—pregnant mares and foals
- Use of fecal tests to determine effectiveness of treatment

The average adult horse should be wormed at least four times a year (every three months) or more frequently if your veterinarian advises. Even an effective program will not eliminate all parasites, but it will keep them at a tolerable level so they will not affect the health of the horse.

## External Parasites Control

External parasites include flies, mosquitoes, lice, etc. The three primary reasons to control external parasites are for the comfort of the horse, to prevent certain skin diseases, and to lower the incidence of some diseases that are transmitted by insects.

The two most effective methods of external parasite control are cleanliness and appropriate use of chemical repellents.

**CAUTION:** Check with your veterinarian if the horse is exhibiting any of the following symptoms:

- 1. Hair loss other than normal shedding
- 2. Excessive itching
- 3. Sores on the skin

*Always follow the label directions on insecticides carefully.*



# *Dental Program — Appendix C*

Each horse that's a yearling or older should have a dental examination by a veterinarian at least once per year. Other examinations might be necessary if symptoms occur.

## **Symptoms that dictate examination:**

- 1. Difficulty chewing.
- 2. Reluctance to drink cold water.
- 3. "Quidding"—dropping food out of the mouth.
- 4. Excessive unchewed grain in the manure.
- 5. Constipation colics.
- 6. Weight loss.
- 7. Swelling or tenderness in jaw region.
- 8. Reluctance to accept a bit.

During the examination, the horse's teeth can be "floated"—filed down to remove any sharp edges that can interfere with proper chewing. In the younger horse, other procedures might also be required, such as removal of "wolf teeth" or "dental caps."

# *Foot Problems — Appendix D*

Unshod horses on open pasture usually do not require routine trimming, but shod horses or those kept in confinement with minimal exercise should be checked by a farrier at frequent intervals. Many horses need trimming every 6 to 8 weeks.

# Appendix E

## CONVERSION TABLES FOR COMMON WEIGHTS AND MEASURES

### Metric conversions

- 1 pound = 454 grams
- 2.2 pounds = 1 kilogram
- 1 quart = 1 liter
- 1 gram = 15.43 grains
- 1 metric ton = 2,205 pounds
- 1 inch = 2.54 centimeters
- 1 centimeter = 10 millimeters = .39 inches
- 1 meter = 39.37 inches
- 1 acre = .406 hectare

### Bushel weights and volumes

	lb/cubic ft.	cubic ft/ton
Oats = 32 lb/bu	26	77
Barley = 48 lb/bu	38.4	53
Shelled corn = 56 lb/bu	44.8	45
Wheat = 60 lb/bu	48	42
Corn & cob meal = 70 lb/bu	28	72
Soybeans = 60 lb/bu	48	42
Rye = 56 lb/bu	44.8	45
Soybean oil meal = 54 lb		37
Dairy feed = 35 lb		57

### Weight conversions

- 8 tablespoons = 1/4 lb
- 3 teaspoons = 1 tablespoon
- 1 pint = 1 pound
- 2 pints = 1 quart
- 4 quarts = 1 gallon = 8 lb
- 2,000 lb = 1 ton
- 16 ounces = 1 pound
- 27 cubic feet = 1 cubic yard
- 1 peck = 8 quarts
- 1 bushel = 4 pecks

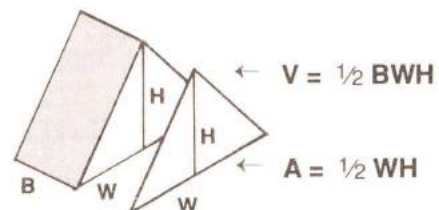
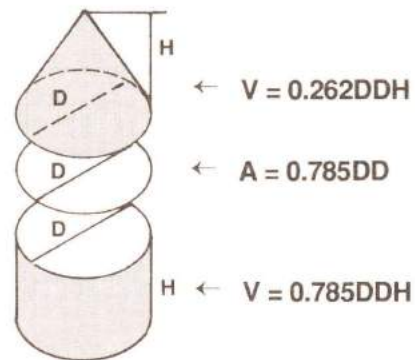
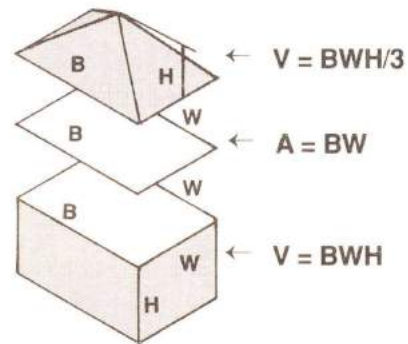
### Other conversions

- 1% = .01
- 1% = 10,000 parts per million (ppm)
- 1 Megacalorie (M-cal) = 1,000 calories
- 1 calorie (big calorie) = 1,000 calories (small calorie)
- 1 M-cal = 1 therm

## STORAGE AND FEEDING DRY MATTER LOSSES OF ALFALFA

Storage method	Storage loss	Feeding loss
Small bales, stored inside	.04	.05
Round bales, stored inside	.04	.14
Hay stacks, stored inside	.04	.16
Round bales, stored outside	.12	.14
Hay stacks, stored outside	.16	.16
Haylage, vertical silo	.07	.11
Haylage, bunk silo	.13	.11

### AREAS AND VOLUMES





# Appendix F

## STANDARD WEIGHTS OF FARM PRODUCTS PER BUSHEL

<i>Product</i>	<i>lb</i>	<i>Product</i>	<i>lb</i>	<i>Product</i>	<i>lb</i>
Alfalfa	60	Corn (shelled)	56	Ryegrass	24
Apples (average)	42	Corn kernel meal	50	Rye	56
Barley (common)	48	Corn (sweet)	50	Soybeans	60
Beans	60	Cowpeas	60	Spelt	30-40
Bluegrass (Kentucky)	14-28	Flax	56	Sorghum	56
Bromegrass, orchardgrass	14	Millet (grain)	50	Sudangrass	40
Buckwheat	50	Oats	32	Sunflower	24
Clover	60	Onions	52	Timothy	45
Corn (dry ear)	70	Peas	60	Wheat	60
Corn and cob meal	45	Potatoes	60	Milk, per gallon	8.6

## MEASUREMENT STANDARDS, HAY AND STRAW

	<i>Average cu. ft/ton</i>	<i>Range cu. ft/ton</i>
Hay, baled	275	250-300
Hay, chopped—field cured	425	400-450
Hay, chopped—mow cured	325	300-350
Hay, long	500	475-525
Straw, baled	450	400-500
Straw, chopped	600	575-625
Hay, loose	480	370-390
Straw, loose	800	750-850



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