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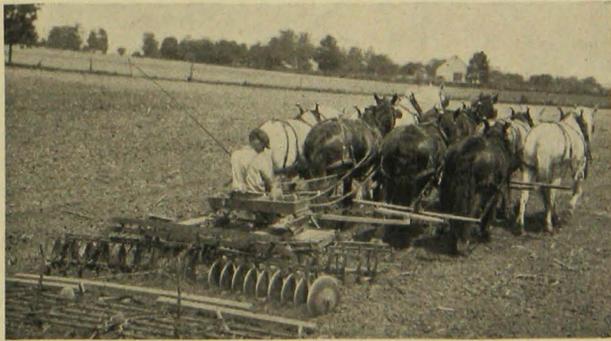
Using Horses on the Farm

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USING HORSES ON THE FARM

Horses are the principal source of power on farms. The 1930 census showed that 86 out of each 100 farms in the United States were operated solely with horses or mules. Undoubtedly the number has increased since then. On Minnesota farms horses are doing three times as much work as the tractor at the drawbar, and if the family use of the automobile and custom work is excluded, horses furnish 50 per cent more horsepower hours than the automobile and 43 per cent more than the tractor.¹ Horses will be used as long as they continue to be the most economical and efficient means of doing farm work.

The increase in mechanical power has decreased the number of horses and mules on farms. According to the census of 1910 there were 820,311 horses and mules on farms in Minnesota; in 1930 there were 758,954. In the United States there were 24,042,882 horses and mules in 1910 and 18,737,567 in 1930. The United States Department of Agriculture estimates that on January 1, 1934, there were 760,000 horses and mules on farms in Minnesota and 16,873,000 in the United States.

To what extent the replacement of horses by mechanical power will continue will depend upon the ability of the tractor manufacturers to produce machines that will be as adaptable as horses for all kinds of farm work and upon the cost of using such machines as compared to the use of horses.

Tractors vs. Horses

The advantages in favor of tractors as a source of farm power are as follows:

1. They can be used in place of horses for work requiring a large amount of power, as plowing, disking, and harrowing.
2. They can do certain kinds of work faster than horses.
3. They may be used continuously for long periods of time.
4. They supply relatively large quantities of belt power.
5. Tractor power may be applied directly to drawn implements by means of the power take-off.

On the other hand, horses have the following advantages:

1. They can be used singly or in multiple hitches in accordance with the amount of power needed for the work to be done.
2. They work better than tractors on soft, wet ground (caterpillar types excepted) and on rough or hilly land.
3. They can be used to better advantage by hired help.

¹ Cavert, W. L. Sources of Power on Minnesota Farms. Minn. Agr. Expt. Sta. Bull. 262, p. 15. 1930.

4. They utilize home-grown feeds, thereby providing a market for surplus crops and eliminating the necessity of a cash outlay for fuel.

5. The manure produced assists in maintaining soil fertility.

6. Colts can be raised on the farm, thereby providing replacements, and in some cases are a source of income without cash outlay.

As power costs are one of the largest items of expense, each farmer should make a thoro study of his business and determine the kind and amount of power that will be best adapted to his conditions. Because conditions vary greatly in different parts of the state and more or less on farms in the same community, a definite rule can hardly be followed to determine when a farmer should use horses alone, or a tractor alone, or a combination of both.

However, from data available,² under present conditions it is not advisable to purchase a tractor for farm work unless at least three horses can be replaced or unless enough additional work can be secured to make the investment profitable.

Horses Best Adapted for Average Farm

Cavert³ states that "Of farms having 50-99 crop acres, the farms with and without tractors had 4 horses. Of farms having 100 to 149 crop acres, those with tractors had 4.6 horses and those without, 5.7, a difference of 1.1 horses. Of the group having 150 to 199 crop acres, those with tractors had 6.3 horses; those without, 7.6, a difference of 1.3 horses. Of the group having 200 or more crop acres, those with tractors had 7.8; those without, 9, a difference of 1.2 horses. The last group had 55 more crop acres, making a total displacement of about 3 horses on farms of 200 or more crop acres. The difference in number of horses displaced is based on estimates of tractor users and on the number of horses used by a similar group without tractors."

In view of these facts, farms that have less than 100 crop acres should be operated with horsepower, except to hire tractors or trucks for such work as plowing, threshing, feed grinding, and hauling. Farms of from 100 to 200 crop acres should be operated by horsepower exclusively unless at least three horses can be replaced by mechanical power or unless enough belt work and custom work can be done to make the use of a tractor profitable. For farms of 200 crop acres and over,

² Cavert, W. L. Sources of Power on Minnesota Farms. Minn. Agr. Expt. Sta. Bull. 262, p. 47. 1930. Schwantes, A. J., and Pond, G. A. The Farm Tractor in Minnesota. Minn. Agr. Expt. Sta. Bull. 280. 1931.

³ Cavert, W. L. Sources of Power on Minnesota Farms. Minn. Agr. Expt. Sta. Bull. 262, p. 47. 1930.

exclusive use of horses or a combination of horses and tractors can be worked successfully.

As the average Minnesota farm consists of approximately 95 crop acres and is operated with 4 horses, the average farmer should continue to use horses as his principal source of farm power.

How to Lower Costs of Horse Power

Horse power costs can be lowered in two ways: (1) by keeping the minimum number required for work to be done and using them to full capacity; (2) by keeping down the cost of feed and other overhead expenses.

Most farms have more horses than are needed. Extra horses are carried throughout the year in case something should happen to some of those that are used regularly. In most cases the expected emergency does not arise, and the extra horses have been carried at a loss.

The number of crop acres per horse in Minnesota ranges from 5 to 93, with an average of about 25 acres. The well planned farms have the greatest number of crop acres per horse and the lowest horse power cost per acre. If the average farmer can operate his farm with one horse to every 25 crop acres, the man who is interested in reducing his horse costs can by good management do better than the average. It will pay each farmer to study his business and determine the minimum number of horses with which he can get along and then dispose of his surplus.

In culling out the surplus horses, one should aim to get rid of the old ones and any others that are not good workers. Keep the young active horses of good size.

The Multiple Hitch

Horses have been used in teams of four or more for a long time, but not until recent years has the extensive use of teams of more than four been advocated on farms of the Middle West. Multiple hitches (formerly called big-team hitches) allow one person to drive four or more horses by means of a tandem hitch in which the lead horses are driven by a pair of lines and the rear horses controlled by tie chains and buck ropes. The advantages claimed for use of the multiple hitch are: (1) A saving in man labor is effected. (2) Two or more farm operations can be performed at once. (3) It assists in eliminating side draft. (4) It equalizes the load for each horse. (5) It allows each horse to work more comfortably. (6) It increases the work done per animal.

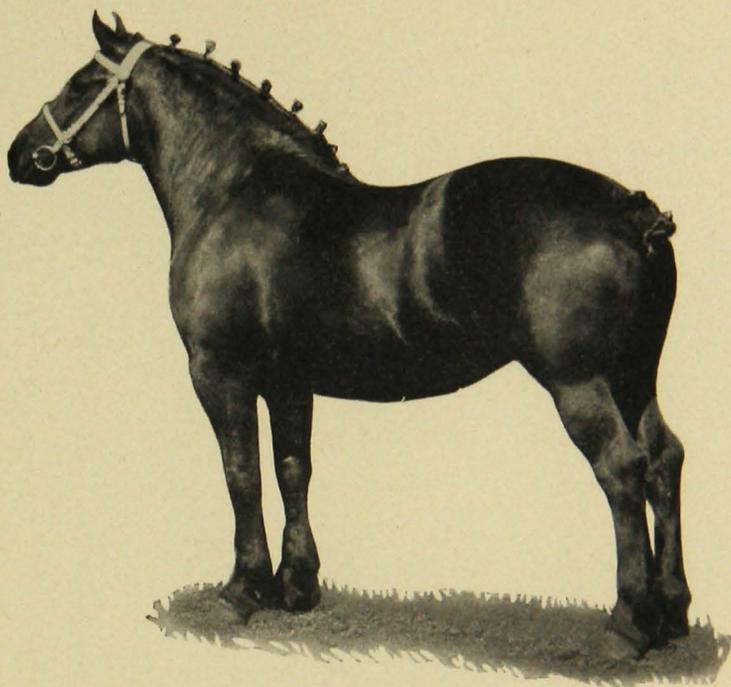


Fig. 1. Three-year-old Percheron Mare, Victoria 200369, Owned by University of Minnesota
An ideal farm mare. She has size, a good middle, good quality, and an energetic disposition.

Instead of sending two outfits of 2, 3, 4, or 5 horses to the field, they can easily be combined into one, thus doing without the services of one man. If the amount of equipment is limited, two or more implements may be combined so that two or more operations can be performed at the same time, as plowing and disking, or disking and harrowing. Not all side draft is eliminated, but it is much reduced, as the system of hitching allows a more direct pull on the implement. Each horse must do his share of the work if adjustments are properly made. If small horses and large horses are used in the team, it is possible to adjust the eveners so that the small horses will do work in proportion to their size. The tie chains compel the slow horses to keep up and the buck ropes hold the fast horses back. The tandem hitch allows each horse more room, he works more comfortably, and he gets more done.

The hitches most adaptable to Minnesota conditions are 5-, 6-, and 8-horse combinations. Detailed application of these hitches is given in Special Bulletin 162.

Cost of Keeping a Horse

The cost of keeping a horse on the farm ranges from \$50 to \$100 per year, according to the amount of work done and the kind of feed

fed. Farm records show that 70 bushels of oats, 20 bushels of corn, 1½ tons of hay, and an acre of pasture will maintain a 1500-1600 pound farm work horse for a year. If present feed prices are used and additional charges made for all other overhead expense, the cost would be about \$75 annually.

The two largest items of expense are feed cost and man labor. About 50 per cent of the total cost of keeping a horse a year is for feed and about 25 per cent is for man labor. These costs will vary considerably in different communities and on different farms. It is to the reduction of those items that the farmer must turn his attention if he hopes to lower his horse costs.

A reduction in feed cost can be accomplished by feeding the horses in accordance with the kind and amount of work performed and by a greater utilization of pasture.

Horses at such hard work as plowing, disking, and harvesting should be fed grain and hay in amounts sufficient, or nearly so, to maintain their weight. Horses at medium or light work do not need so heavy a ration as those at hard work, but enough feed should be given to supply their needs. As soon as the work is lighter, the amount of grain should be reduced. If a horse is allowed to remain idle even for part of a day, the amount of feed should be cut down, not only for the purpose of lessening costs of feed, but also to prevent digestive disorders. However, the greatest saving can be made not by skimping on the rations for working horses, but by economical feeding when they are idle.

Idle horses should be turned out on grass in the summer time with no extra feed, unless the pasture is very poor. In the winter they should be allowed to run in the stalk and stubble fields and be fed, in addition, all the roughage, in the form of cornstalks, straw, and hay, that they need to maintain their weight. The practice of turning work horses out on pasture at night during the summer months materially reduces the amount of roughage required and adds much to the comfort of the horses.

Man labor in connection with caring for work horses can be reduced by a handy arrangement of the barn, by turning horses out on pasture when they are idle, and by feeding roughage in racks outside the barn. This eliminates the necessity of bedding the stalls and cleaning the barn, besides saving time in feeding.

The charge for shelter can be reduced by turning the idle horses out in the winter and using the barn for other livestock more in need of warm quarters. Access to a straw shed or a shed that is open on the south will supply the horses with all the protection needed in bad

weather. Horses handled in this way keep in better health than those too closely confined in barns.

The Horse Supply

The question of providing replacements for their horses confronts many farmers. Horses must either be purchased or colts must be raised.

The present situation can be summed up as follows:

1. The surplus of horses has been wiped out, even in the western states.
2. It requires annually 66 colts per 1,000 horses and 55 mule colts per 1,000 mules for replacements only.
3. Only 35 colts per 1,000 horses and 24 mule colts per 1,000 mules were raised in 1930.
4. Thirty per cent of the horses and mules in Minnesota are over 16 years of age.
5. It takes from 3½ to 4 years to produce a work horse.
6. The estimated cost of raising a work horse is \$75.

These facts indicate that it is a good policy for the average Minnesota farmer to raise at least enough colts to replace his horses. During the next few years it may prove profitable for him to raise an additional colt or two to sell.

In order to raise good work horses, the best and youngest mares on the farm should be mated to a good stallion. It is often difficult to secure the service of a good stallion because few are available. Table 1 shows the decrease in licensed stallions in Minnesota during recent years. Not only has the number of stallions decreased, but their quality has deteriorated as well. There are comparatively few good stallions in the country.

Table 1
Licensed Stallions in Minnesota

Year	Number licensed	Average per county
1912	4,445	52.9
1921	2,088	25.0
1930	1,345	15.8
1933	1,249	14.7

How to Secure the Services of a Good Stallion

If the services of a good stallion are not available, the mare owner can either purchase a stallion himself, purchase one in partnership with one or more other mare owners, or he can purchase a share in a stallion with other members of his community.

Private ownership allows the mare owner the opportunity to select a sire he likes. He can use the stallion on his own mares and limit

the use for public service as he sees fit. By paying cash and buying privately he can usually make the purchase at a reasonable price. On the other hand, many do not care to invest from \$300 to \$1,500 in a stallion and assume all the risks, with the possibility of not getting enough outside mares to breed to make the investment profitable.

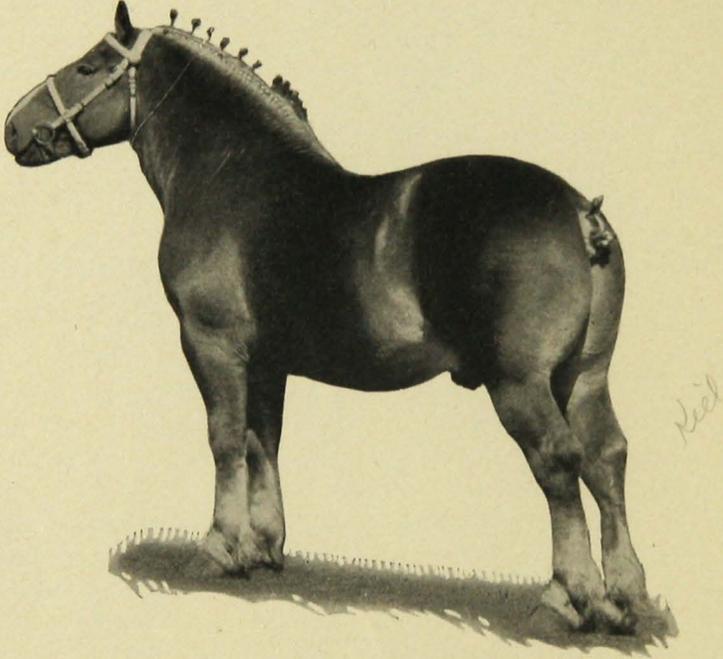


Fig. 2. Three-year-old Belgian Stallion, Lowenstein 16928, Grand Champion Minnesota State Fair, Owned by University of Minnesota
Farm mares bred to a stallion like this will produce highly desirable colts.

During the last two years many farmers who have had an eye toward the future have been purchasing stallion foals and yearlings. One of the principal advantages in purchasing a foal is the low cost. In most cases the price ranges from \$75 to \$200, with an average around \$125. If the colt is a growthy one, the purchaser will put him at light work in the spring that he is two years old. The work the colt does will be just the exercise he needs for proper development. The training he gets will be an asset when he is old enough to breed mares. The colt can be used to breed the owners' mares during the year. In this way the colt will just about pay for himself and for his feed and care by the time that he is three years old.

Partner ownership has all the advantages of private ownership and all partners have a share in the risks involved.

Community ownership, by either the "mare" plan or so-called "colt club" plan, makes it possible for a community to secure the services of a good stallion without any one person having to invest a large sum of money. More money is available for the purchase of a sire, and usually a better one is secured. If a man has an interest in a horse, greater care is taken to get the mares in foal and to raise the colts. This method of ownership also insures uniform colts in the community, making it easier to match teams and also easier for a buyer to choose a uniform carload of horses if a surplus is raised. The disadvantage of community ownership is that in most cases stallions cost more when purchased this way because few communities will get together on their own accord. Usually a salesman for a breeder or dealer has to organize the mare owners before he can sell them a horse. This sales expense, as well as credit, often extended, necessarily increases the cost of the stallion to the group.

The community plan is a satisfactory means of purchasing a stallion, but it would be more economical if mare owners would organize their own club,⁴ decide on the kind of horse needed, advance enough money on the mares to be bred to cover the cost of the stallion, select a man or a committee to make the purchase and instruct the committee to purchase from a reliable breeder or dealer. In this way services of a good stallion can be secured at a minimum cost.

FEEDING AND CARE OF HORSES

Feeding Work Horses

No one feed or combination of feeds will meet conditions in all parts of the state. Usually, the crops grown locally will provide the most economical rations. The kinds of feed used, the quantity per horse, and the manner of feeding depend upon the age, size, and condition of the horse and the kind and amount of work.

In general, the average horse requires about $1\frac{1}{3}$ pounds of good sound grain and $1\frac{1}{4}$ pounds of good, bright, clean hay per 100 pounds of live weight per day, when at hard work. The grains commonly fed to horses in Minnesota are oats and corn. Oats are 70 per cent digestible and fairly high in protein. The kernel is incased in a hull which, tho furnishing little nutriment, gives the grain bulk and prevents digestive trouble through gorging. Corn is high in feed value, but is low in protein and mineral matter. When corn is fed, a high-protein supple-

⁴ W. E. Morris, of the University of Minnesota, perfected a plan for community ownership of a stallion. A copy may be had by writing him in care of the Extension Division, University Farm, St. Paul, Minn.

ment should be fed with it. Barley, wheat, and rye are sometimes fed, but their physical character makes them undesirable. They have a tendency to become pasty and "ball up" when being chewed, which may lead to impaction in the stomach or bowels, while the beards of the grain cause more or less trouble. If barley, wheat, or rye is used, it should be fed in combination with other feeds. Wheat bran and linseed meal are the supplements that are safe to feed to horses. Both are high in protein and laxative in effect. Wheat bran should not constitute more than 20 per cent of the ration, and not more than 1½ pounds of linseed meal per day can be fed safely to horses.

Prairie hay, straight timothy, or timothy and clover mixed are the most common roughages fed to work horses. A ration composed entirely of alfalfa or clover hay is not recommended because these feeds are softening to the muscles and too laxative. However, alfalfa or clover can be fed to very good advantage along with other roughages if it does not exceed half of the hay ration. Following are a few sample rations for a 1,500-pound horse at hard work:

Pounds		Pounds	
1. Oats	17	2. Ear corn	20
Bran	3	Oats	5
Timothy or prairie hay	10	Alfalfa or clover hay.....	10
Clover or alfalfa hay.....	8	Timothy or prairie hay	10
		Pounds	
3. Shelled corn	17		
Bran	3½		
Oilmeal	1½		
Timothy or prairie hay	18		

No preparation of the feed need be made unless the horses are old or their teeth are bad, in which case it would be best to grind the grain. The grain should be fed in three equal feeds per day; the largest share of the hay should be given at night. Horses should be watered regularly at least three times a day, and salt should be accessible at all times.

Because of the peculiar digestive system of the horse, he is subject to founder, colic, and azoturia. These ailments are brought about largely because of lack of judgment on the part of the feeder. When horses are at hard work they must be given large quantities of feed, but as soon as the work lightens or the horses stand idle a part of the day, the grain ration should be cut down at least a third. It is very good practice to substitute a bran mash made by mixing about 5 pounds of wheat bran with warm water and adding a tablespoonful of salt for the regular evening feed of grain on Saturday nights.

The extensive use of pasture for work horses cannot be overemphasized. Horses that work every day should be turned out at night while the weather is good. Not only does this keep the digestive system toned up, but it decreases the amount of hay needed and eliminates the necessity of bedding and cleaning the stall each day. Horses turned on grass at night may sweat a little more than those given only dry feed, but the benefits derived by being out in a clean, cool place where they can roll, graze, and obtain water at will more than overbalance this slight disadvantage.

Working Horses in Hot Weather

Close watch must be kept of the horses at work in hot weather so that they will not become overheated. Horses that have been affected by the heat never fully recover. The way to avoid overheating horses is to work them early in the morning, late in the afternoon, and in the evening; to allow them to rest often and to give them an extra pailful or two of water in the middle of the morning and the afternoon.

Symptoms of overheating are: A slowing up of the natural gait, a tendency to wobble in walking, rapid breathing, excessive dilation and redness of nostrils, watery and bloodshot eyes, and high temperature, accompanied by little or no sweating. If such symptoms are noticed, the horse should be taken to a shady place, its body sponged, and its legs showered with cold water. Its mouth and nostrils should be washed out and ice packs applied to the head. It is always wise in such cases to call a veterinarian.

The Brood Mare

A young mare that is to be developed and used as a brood mare should be bred when she is three years old to produce her first foal when about four years old. The natural breeding season for horses is the spring of the year. This fact must be taken advantage of and the mares bred generally from March to July. Few mares will come in heat before the weather begins to get warm in the spring and few continue to come in heat after July. Getting the mare in foal presents more of a problem than in the breeding of other livestock. Usually not more than 60 to 75 per cent of the mares bred will prove to be in foal even tho they are retriéd several times following the first service. The farmer should recognize this and breed enough mares so that he will be sure to have as many colts as are desired. On small farms mares that are not in foal may be given the hard work to do, and no loss will be experienced because of their not raising colts.

The one economical and satisfactory way of handling the brood mare is to keep her at work throughout the year. The mare that is bred in the spring but is not suckling a foal may be worked and fed throughout the summer and fall just as any work horse would be. The mare that is raising a foal and is bred again should be given the lightest work and should be handled and driven carefully and quietly. It is generally considered preferable to have as many as possible of the mares that are to raise colts foal early in March or April. A brood mare should be counted on as a regular work horse. Therefore, it would be a serious handicap to the spring work if she should foal in the middle of the busy spring seeding season and have to be rested for a few days. On this account, it is desirable to try to adjust the breeding date so that the mare will foal either before the spring work begins or not until after it is practically complete—late in May or in June.

Feeding the Pregnant Mare

The ration usually fed to a work horse is a good one for the mare in foal. One must keep in mind, however, that a pregnant mare that is working and may be nursing a foal at the same time is comparable to a hard-worked horse and must be fed accordingly. Feeds that are rich in protein and mineral matter, as oats, bran, clover, and alfalfa, should be used as a basis for a satisfactory ration. A very good ration consists of 75 per cent oats, 20 per cent wheat bran or its equivalent, and 5 per cent linseed meal, with bright clover or alfalfa hay as half the roughage and prairie or timothy hay, oat straw, or corn stover as the rest. Care must be used in feeding to guard against the mare's becoming too fat, lest she have difficulty in foaling. A few days before foaling and for a short time after, the mare's ration should be reduced considerably and made laxative by the addition of more bran or by occasionally giving only a bran mash instead of the regular grain ration.

Care at Foaling Time

The period of gestation in the mare ranges from 315 to 350 days; the average is about 330 days, or eleven months. The mare should be rather closely watched from the tenth month until the time she foals. Certain signs indicate the approach of parturition. About a week or ten days before foaling, there is a marked falling away of the muscular parts at the top of the buttocks, in back of the hips. The udder becomes distended, but the teats seldom become full and plump until two or three days before the foal is born. Wax often appears at the ends

of the teats at this time. However, once in awhile a foal may be born without any of these signs.

The best place for mares that are bred for May or June colts to foal is in the pasture. Mares bred for early foaling must have a roomy, well lighted and well ventilated box stall, thoroly cleaned and freshly bedded. During the night it may be necessary for someone to be near at hand in order to render assistance if needed. If the mare does not foal alone within a reasonable length of time, she should be helped. A mare foals rapidly and if assistance is needed, it must be given promptly or it will do no good. If the foal is not presented normally (forefeet and then the nose), a veterinarian should be called.

As soon as the colt is born the attendant should clear its mouth and nostrils of mucous, and it may be necessary to rub the ribs vigorously to stimulate respiration. If the navel cord does not break, it should be severed by scraping it apart about two inches from the colt's body. Regardless of how the navel is severed, it should be disinfected by dipping it in tincture of iodine or mercurochrome or by dusting it with some disinfecting powder, such as boric acid or iodiform powder. As soon as the mare gets up, give her a drink of water from which the chill has been removed.

Mares that have had no trouble in foaling will be able to do light work within a week, if necessary; others may have to rest longer. In either case, however, the mare and foal should be given light exercise each day, beginning two or three days after foaling, as exercise is necessary for the health of both and it greatly assists in strengthening the colt's legs.

The feed of the mare should be held down until the colt is able to take all the milk, after which she can be fed in accordance with the amount of milk she produces and the amount of work done.

The Suckling Foal

It is sometimes necessary to help the new-born foal to nurse by assisting him to stand up and by placing the teat in his mouth. It is essential that he get the first milk from the mare, as it is a natural purgative, which assists in removing the material that has accumulated in the digestive tract of the foal during the last few days of its development. The colt's bowels will usually move within six hours after birth, but if they do not, it should be given a couple of ounces of castor oil. Some breeders prevent the possibility of the colt's becoming constipated by giving a rectal injection of warm soapy water shortly after birth.

When the mare goes back to work, the colt should be left in the barn away from the heat and flies and out of the road. It is a good plan to allow him the run of a large box stall that opens into a lot. If there are two or more colts, they can run together; in this way they will be company for each other and still get plenty of exercise. At first the mare should be brought to the barn in the middle of the forenoon and afternoon to allow the colt to nurse. When the colt is three or four weeks old, this practice may be discontinued, but the mare's udder should be milked out a couple of times during the day and also a little just before the colt is allowed to nurse at noon and at night. This is especially important if the mare has been worked hard and during warm weather.

At about four weeks of age the colt will begin nosing into his mother's feed box and hay manger. As soon as he learns to eat a little, he should have a grain box and hay manger of his own where he can be fed a little oats and bran and some good hay, preferably clover or alfalfa.

Colts are usually weaned when they are 5 or 6 months old. Weaning is not a difficult task if the colt has been fed all the grain and hay he would eat while nursing. The best method of weaning is to take the colt away from the dam and keep him away. The mare's ration should be cut down at least half until she dries up and her udder should be milked out occasionally in order to prevent caking. The mare should be kept at work, as exercise assists in the drying-up process.

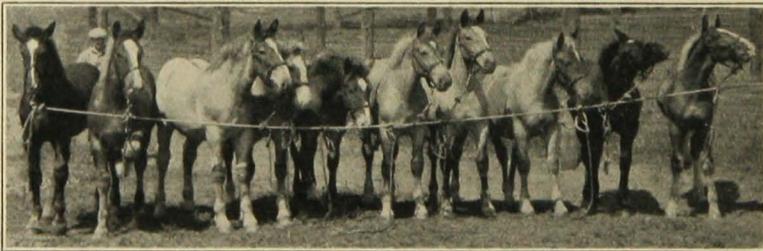


Fig. 3. The 1931 Foal Crop at University Farm
Average Age 5 Months.

Raising an Orphan Foal

Sometimes it becomes necessary to raise a foal that has lost its mother or whose mother has not sufficient milk. Mare's milk is higher in percentage of water and sugar than cow's milk and lower in other components, so that in raising an orphan on a bottle, care must be taken

to provide milk of about the same composition. Milk from a fresh cow, low in butterfat, should be used. To about a pint of milk add a tablespoonful of sugar and from three to five tablespoonfuls of lime water. Warm to body temperature and for the first few days feed about one-fourth of a pint every hour. As the foal grows, increase the amount. After three or four weeks the sugar can be stopped, and at five or six weeks skim milk can be used entirely.

Growing the Colts

On most farms the foals do well up to the time they are weaned, but from then on, life is rather difficult. At weaning time they are turned out on pasture, which at that time is usually poor, and from then on until they are old enough to be put to work they must rough it. This is poor practice, particularly from weaning time until they are a year old, because a horse should make half his mature weight during his first year, and colts that are not well fed during this time never fully recover their normal growth. It is therefore important that a weanling be well fed and cared for during his first fall and winter. Even if the fall pasture is good, it is a good plan to give the colt some additional feed.

Feeds that promote growth should be supplied. Good, clean clover hay is palatable and slightly laxative. Timothy hay is commonly fed. Well cured alfalfa hay, free from dust, is one of the best roughages for growing colts, but because of its relatively high protein content it generally is economical to supplement it with other roughage, such as timothy, mixed hay, or corn fodder. Besides lending variety to the ration, such a method of feeding alfalfa would offset any likelihood of kidney or bowel irregularities. Sheaf oats may be used to advantage to supplement other roughage. The colts should be given only what they will clean up readily, but at the same time enough feed should be supplied. Oats, corn, and peas, preferably well ground, are suitable grains. Bran, linseed meal, or gluten feed will add protein and lend variety. Appropriate grain rations for the first winter are: Four parts oats, one part corn, and one part bran; or five parts oats, two parts corn, three parts bran, and one part linseed meal.

Silage should not be fed to foals to any considerable extent. Sliced carrots and sugar beets are very palatable and have a cooling effect on the digestive system. The quantity of feed should be regulated by the appetite, altho occasionally the appetite may be too ravenous. Usually not more than one pound of grain per 100 pounds of live weight should

be fed until the animal is two years old. A liberal supply of salt and pure water and plenty of fresh air and exercise are essential for the proper development of young horses.

Colts may be housed satisfactorily in either the stable or an open shed. The main requirements are that the quarters be dry and sanitary, and provide fairly good protection from winds. Several foals may run together if the weaker ones are not driven away from their feed by the stronger ones. The quarters should be kept clean and well bedded and occasionally should be disinfected. Lice are to be suspected when the animals rub and lose patches of hair. Thoro washing with the proper solutions of coal-tar disinfectants will kill lice. It costs money to feed lice; consequently efforts should be made to keep the colts free from them. The foals should be in the open every day that is not stormy; it is harmful, however, for them to be in a cold rain. During the first winter the foal should be taught to lead and to stand tied.

Feeding and Care of the Yearling and Two-Year-Old Colts

If colts have been well fed and cared for until they are ready to be turned out on pasture when they are a year old, they will get along nicely from then on with little care. As soon as the grass is old enough so that it will not be too washy, the colts should be turned out to pasture. The change from dry feed to grass should be made gradually. In some years the pasture becomes bare along about the first of August; then it may be necessary to supplement it with hay and one feed of grain a day in order to supply the needs of growing colts. During the second winter and to the time they are ready to go to work, at $2\frac{1}{2}$ or 3 years, colts can be fed and handled in much the same way. The quantity of feed will have to be increased in proportion to the size of the colt, but the quality need not be as good as that fed the first year. In other words, coarse, rough feeds, such as cornstalks, sweet clover hay, and oat straw, properly balanced with a little grain, can be used to good advantage.

The best time to castrate a stallion colt is in the spring when he is a year old, just after he has been turned out on pasture. At this time the chances of infection are small.

From weaning time on, the feet of the colt must be watched closely and trimmed whenever necessary. Some colts' feet grow faster than others, but as a rule a trimming every two months will keep them in good shape. Feet should be trimmed so that they will be level; usually trim only the outer rim. Sometimes it is necessary to cut down the

heel or shorten the toes. Occasionally the sole of the foot becomes infected, in which case it should be trimmed out and thoroly disinfected.

Feeding the Idle Work Horse in Winter

Horses that are idle in summer can simply be turned out to pasture. In winter, shelter and feed must be provided. Many farmers keep all their horses in the barn during the winter. This method is not economical, nor is it necessary. After the fall work is done, one should decide which of the horses are to be used for work around the farm during the winter and which are to be turned out to rough it. If any mares are in foal, they should be used. In that way they will receive enough exercise, they can be given a little extra feed if necessary, and they will also be under close observation. The horses that are not to be used can be turned out with the growing colts to pick up what they can from cornstalk fields and grain stubble fields. Other roughage, such as corn fodder, wild hay, and oat straw, can be fed as needed in racks in the barnyard. In addition, a small quantity of good legume hay or grain rich in protein should be given daily in order to help balance the ration and keep the animals in good health. The amount to be given will depend upon the condition of the horses when turned out and how much gain is to be put on during the winter. If a straw shed or a frame shed opening on the south is available for the horses to run into for protection during stormy weather, it is more desirable to handle them all in this way than to try to care for them in a barn where they would have to be cared for individually.

Preparing for Spring Work

About the first of March preparations for spring work should be started. The work horses should gradually be changed from a ration consisting largely of coarse roughage to one that contains a large proportion of grain and better hay. They should do a little work each day in order that the muscles may become hardened gradually. The amount of feed and work should be increased fast enough so that the horses will be able to go into the fields and do a good day's work when spring work begins.

Special attention must be given to the shoulders at this time so that they will not gall. After the harness is removed, wash the shoulders with warm water and soap; then rinse with cold water to which a handful of salt has been added. This treatment toughens the skin. It may be necessary to continue this treatment throughout the spring and

summer. Small galls can be effectively treated by painting them with tincture of iodine.

Fitting the Collar

The collar must be fitted so that the pull will be distributed equally over the shoulders. There should be room enough to pass the flat of the hand between the collar and windpipe and for the fingers to pass at the side of the neck just above the shoulder points. Do not use sweat pads unless absolutely necessary. They are hot, dirty, and hard to keep clean and may cause sweened shoulders. After the right sized collar is found and has been properly fitted on a horse, it should not be changed to another. In removing the collar, do not unbuckle it but merely slip it over the horse's head. This is a quicker method and prevents breaking it at the neck, thereby lengthening the period of service. The hames should fit snugly and be adjusted so that the point of draft will be about one-third of the distance above the point of the shoulder.

Care of the Harness

At least once a year the harness should be taken apart and cleaned, repaired, and oiled. After the harness has been soaked about fifteen minutes in lukewarm soapy water, each strap should be scrubbed carefully and rinsed. Add blacking where needed and then oil while still wet with neats' foot oil or a good commercial harness oil. If the harness is very dry a second oiling may be necessary.

Feeding and Care of the Stallion

During the breeding season the stallion should be fed as is a hard-worked horse, which means that if he weighs 2,000 pounds, he will require from 20 to 25 pounds of grain per day and about the same amount of hay. The best grain to feed is whole or rolled oats with about 15 per cent of wheat bran. Not much corn should be fed, especially during the breeding season, as it is too fattening. A mixture of timothy and clover hay is excellent as roughage, altho prairie and alfalfa hay can be substituted to good advantage. The hay must be of good quality and not dusty or moldy. After the breeding season is over, the amount of grain should be reduced and the proportion of roughage increased. Water and salt must be supplied regularly.

It is absolutely necessary for a stallion to get plenty of exercise if he is to maintain his vitality and breeding ability. In going from farm to farm, during the breeding season, from 5 to 20 miles are covered per day, which is sufficient. If the stallion is not travelled during the

breeding season, exercise can be secured by having an exercising yard connected directly with an outside door to his box stall so that he may have the free run of both the box stall and the yard. This yard may be fenced with a high board or a strong woven-wire fence. Many owners who stand their stallions at home, work them every day. This is a very good practice. Besides getting enough exercise, the stallion is paying for his keep as a work horse. It is important to keep the stallion's feet trimmed. If the owner can not trim the horse's feet himself, he should have the blacksmith or horse-shoer do it.

Stallion owners make the mistake of using their stallions too much. A two-year-old should not be allowed to serve more than 8 or 10 mares per season; a three-year-old may breed from 25 to 30; a four-year-old from 40 to 50, and a mature horse from 75 to 100. The number of mares served should be limited to one in five days for the two-year-old and two a day for a mature horse.

SUMMARY

1. Horses are the principal source of power on Minnesota farms. They are doing three times as much work at the draw-bar as the tractor.
2. The advantages of horses as a source of farm power are that they are easily adapted to the work to be done, they can be used successfully on soft, wet ground and on rough or hilly land, they utilize home-grown feeds, the manure they produce assists in maintaining soil fertility, and colts may be raised.
3. Under present conditions it is not advisable to purchase a tractor unless at least three horses can be replaced, or unless a large amount of custom work can be secured.
4. On farms of less than 100 crop acres, horses should be the sole source of farm power; on farms of 100-200 crop acres, horses should be the sole source of farm power unless a large amount of belt work or custom work can be done with a tractor; on farms having more than 200 crop acres, horses alone or a combination of horses and tractors may be used.
5. The average Minnesota farm consists of about 95 crop acres and is operated with 4 horses.
6. The cost of horse power can be lowered by using to capacity a minimum number of horses and by keeping down the cost of feed and handling.

7. The use of the multiple hitch saves man labor and increases the amount of work performed per horse.
8. The average cost of keeping a horse is about \$75 per year.
9. At present only about half enough colts are being raised to provide replacements.
10. Farmers should plan to raise their own replacements.
11. Community ownership is an excellent way of obtaining the services of a good stallion at a low cost to the mare owner.
12. There is much room for improvement in the use, feeding, and care of horses.