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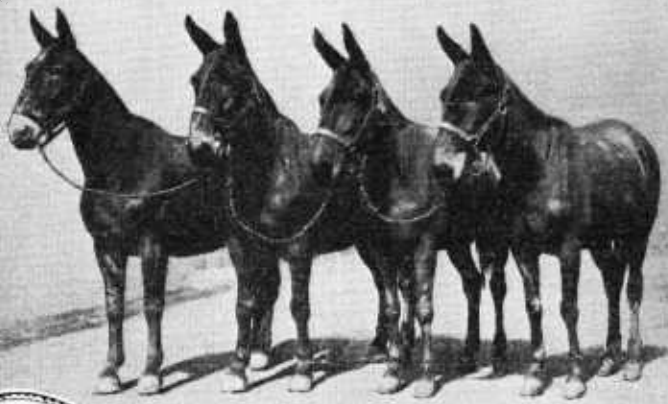
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~ MULE ~
PRODUCTION



THE ABILITY of the mule to endure hardship and perform sterling service under adverse conditions has established him as a real asset in American agriculture.

The mule will give best service under favorable conditions of feeding and management.

Good, sound mares should be selected for breeding in order to be successful in producing high-grade mules. A very desirable "mule mare" is one having about one-fourth draft blood.

The most practical feeds to use for mules are those which are grown on the farm or plantation so far as they provide the essential nutrients for a balanced ration.

The general form and appearance of the mule should resemble closely that of a horse, and in judging mules the same general points of perfection should be looked for.

Mules vary in height from 12 hands to 17½ hands and in weight from 600 pounds to 1,600 pounds.

While the mule is essentially a draft animal, it is used widely for utility purposes, especially in the South. A smart, alert mule, with a long, free stride at the walk and a snappy, balanced trot is highly desired.

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MULE PRODUCTION.¹

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DISTRIBUTION OF MULES IN THE UNITED STATES.

THE importance and popularity of the mule as a work animal are attested by its extensive use in farm operations. In 1910, the number of mules on farms and ranches in this country was 4,209,769. The number on January 1, 1920, increased to 5,432,391, and on April 1, 1930, the total was 5,375,017. Of the 5,375,017 mules on farms in 1930, 3,456,235, or approximately 65 per cent, were in the nine Cotton Belt States, which in number of mules rank as follows:

Texas-----	1, 040, 106
Mississippi-----	369, 345
Arkansas-----	361, 508
Georgia-----	353, 633
Alabama-----	332, 133
Oklahoma-----	315, 353
North Carolina-----	294, 308
Louisiana-----	200, 954
South Carolina-----	188, 895
Total-----	3, 456, 235

The only States outside the Cotton Belt having more than 150,000 head of mules on farms in 1930 were Tennessee, with 318,567; Missouri, with 295,778; Kentucky, with 252,250; and Kansas, with 151,470. The total number of horses on farms in the Cotton Belt States on April 1, 1930, was 1,845,904, or about 53 per cent as many as mules. The only Cotton Belt State having more horses than mules in 1930 was Oklahoma.

¹In the preparation of this bulletin the writer is indebted for helpful suggestions and assistance to G. A. Bell, horse-breeding expert in the Remount Service, War Department, and R. S. Whitfield, a former employee of the Animal Husbandry Division.

ADVANTAGES OF THE MULE AS A WORK ANIMAL.

The mule is a hardy work animal. While this humble creature responds to good treatment and gives best service under favorable conditions of feeding and management, it is his ability to endure hardship and to perform sterling service under adverse conditions that has established him so firmly in American agriculture. Those who are staunch supporters of the mule say that, in comparison with the horse, he will live longer, endure more work and hardship, require less attention and feed, is less liable to digestive disorders, lameness, and disease, is more easily handled in large numbers, is less irritable, and is more capable of performing work in the hands of a mediocre or poor horseman. Whether or not all these claims may be



FIG. 1.—A pair of farm mules.

substantiated, it is a fact that the mule is well established as a work animal in those sections where climatic conditions are most severe, feed less abundant, and horsemanship is not a prevailing art (Fig. 1).

SOME PECULIARITIES OF THE MULE.

The mule is an animal with possibly more eccentricities and undeniable virtues than any other domestic animal. One would naturally expect from his heritage a rather unusual temperament requiring the most thoughtful treatment. The difficulty is to know how to handle the mule in order to keep the desirable qualities of his maternal ancestry in the foreground and to keep subservient the latent donkey characteristics. To treat consistently a conglomeration of stubbornness and willingness, temper and sullenness, contentment and restlessness, slyness and docility, faithfulness and waywardness, with no knowledge of which virtue or vice is going to assert itself next, is

a problem which may well tax the qualities of the best horseman. Yet the virtues of the mule have been so evident in times of peace and war that many ardent horse lovers who have been prejudiced against him have come to admire the animal which has no "pride of ancestry or hope of posterity" (Fig. 2).

There are some peculiarities which belong to the mule alone. He does not like to be hurried, worried, or cuffed about; to try to force him to do things against his will is practically impossible and only makes matters worse. The mule must be understood and gently but firmly persuaded to do things out of the ordinary. He is naturally suspicious of everybody who comes around him, and it can be readily observed that he never takes his eye off a person near by, and when the ears begin to wag a little the person watched had better



FIG. 2.—Many mules find their way into the U. S. Army. Good, sound mules with quality are required. This illustration shows representative types of "lead" and "wheel" mules in Army service.

be on the lookout. There seems to be a code system of ear signaling among mules that they all understand. A mean mule can deftly handle his hind legs, and his forelegs are not to be ignored. He has been known to handle his "mits" in a clever fashion. The mule seems to have an uncanny way of detecting whether a person is going to treat him harshly or kindly, and his reception is usually in like manner, nor does he forget the person who inflicts harsh treatment.

There is a wrong and a right way to lead a mule. A man who looks at a mule and lugs at his head will never make any progress. The mule will not be pulled. He will usually follow quietly, however, if a man will walk away in the direction he desires to go. Neither can you "bully" mules into going through tight places; they are somewhat like sheep, and if the leader can be induced to go the rest will follow.

Next to satisfying a hearty appetite the height of mule joy is to roll. A mule will roll at every opportunity and often at inopportune times, when he makes the opportunity suit his own convenience. He dislikes mud and water holes in the road, and is what is known as a sure-footed animal.

PRODUCTION OF MULES.

The mule is a hybrid animal having a jackass, commonly called a jack, for a sire and a mare for a dam. When the reverse cross is made and the female ass (or jennet) is bred to a stallion, the off-

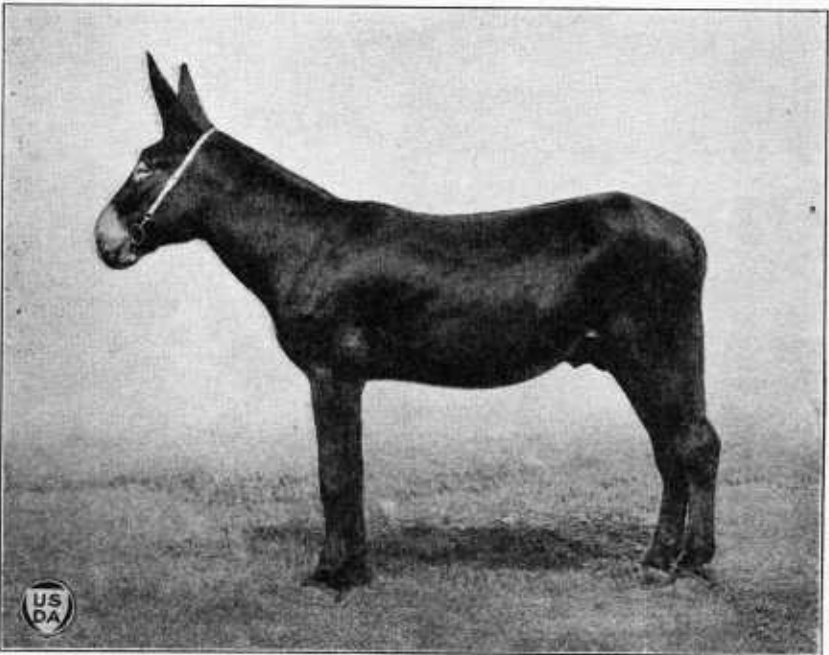


FIG. 3.—A prize-winning jack. Note size of bone and general quality throughout.

spring is called a "hinny." As the mule will not reproduce, it is necessary to maintain both jacks and mares in order to produce mules.

SELECTING THE JACK.

The importation of jacks, and consequently the production of mules, dates back to colonial times. About 1787 George Washington was presented with a jack by the King of Spain, which was used in the stud at Mount Vernon. Many good mules were produced in those days, and the value of the mule as a work animal was soon recognized by intelligent planters. It has been within the last 40 years, however, that the production of mules has been an extensive enterprise and that much attention has been given to the rearing and selection of the best jack stock.

The American jack of to-day is a composite of the bloods of some of the best foreign breeds, and in attaining the highest standard of excellence prevailing in the jack stock of America the breeders have emphasized the valuable utility points so much desired in the best jacks, such as size, weight, bone, style, quality, and action. In America jacks are usually spoken of as jennet jacks and mule jacks. As these terms imply, jennet jacks are used for mating with jennets for the reproduction of the breed, and mule jacks are used for mating with mares for the production of mules.

A good mule jack (Fig. 3) should be not less than 15 hands high and possess plenty of weight, large bone with quality, style, and action. The essential points of conformation in a good jack are a straight, strong back, closely coupled and well muscled over the loin; long and level rump; deep body and spring of rib to allow ample room for lung development. Vigor and strength of constitution are indicated by a broad chest and large heart girth.

The legs should be set straight, be well muscled, and have plenty of bone. The length of leg should be in proportion to depth of body, as height obtained by length of leg is undesirable. The size of the bone is very important and should be ample. The size of the bone is usually determined by measuring the cannon bone about half-way between the knee and the fetlock joint. This circumference should be $8\frac{1}{2}$ inches in a jack of 15 hands' height. It is very desirable to have large, well-shaped feet. The head should be well proportioned, with the profile of the nose straight or slightly roman. The ears should be long, well set, and alert on a mature animal and should measure, horizontally, 33 inches or more in length from tip to tip.

Measurements of a good jack.¹

[Weight, 1,200 pounds; height (standard measure), 15 hands, 3 inches.]

	Inches.		Inches.
Ears from tip to tip-----	34	Around body at girth-----	70
Around face and jaw-----	39	Around body at loin-----	67
Around neck at throatlatch-----	36	Around hoof, below coronet (next	
Around arm-----	21	to hair)-----	16 $\frac{1}{2}$
Around cannon-----	8 $\frac{1}{2}$	Above hock-----	17 $\frac{1}{2}$
Length from poll to tail-----	84	Below hock-----	9 $\frac{1}{2}$

Some of the common defects in jacks which should be avoided are: Flat, narrow chest, which indicates a weak constitution and lack of vigor; light-muscled loin and long coupling; short, drooping rump; excessive length of leg; small feet with contracted heels; and short or droopy ears.

CARE OF THE JACK.

The proper care and management of the jack are somewhat exacting, as he is rather peculiar in his likes and dislikes. While a stallion may be spoiled because of his nervous temperament, the jack may be just as quickly spoiled because of his inclination to be sluggish. The jack should have a caretaker who understands jack man-

¹ Twice champion at the Missouri State Fair and reserve champion at the World's Fair, San Francisco.

agement thoroughly. This is very important, as the disposition of the jack is partly controlled by the groom. The jack should be quietly but firmly handled, as a bad disposition in a jack is usually attributable to harsh handling or mismanagement of the animal when young. Through continuous observation the groom should learn the peculiar individuality of the jack and the little things required for his proper management.

Abundant exercise is one of the big factors in the management of a breeding animal. A roomy, well-ventilated, and well-lighted box stall opening to an exercising paddock is necessary for the proper care of the jack. It is important that the exercising paddock be of good size. In order to insure plenty of exercise, however, it is well to give the jack some road work.

A young jack intended for siring mules should not be permitted to run with jennets or mules, as this practice usually leads to difficulty in teaching him to serve mares, when used in the stud. Instead the young jack should have fillies or gentle mares for companions. The jack may begin serving mares at the age of 2 or 2½ years, but he should not serve more than one mare a day during his first season nor more than 30 for the entire season. A mature jack may serve as many as two mares in a single day provided the two services are several hours apart. The number of mares a jack should serve during a season depends on the strength and vigor of the individual, but 70 or 80 mares probably is the maximum number that he can serve with satisfactory results. Artificial breeding may be employed if the jack is patronized very heavily. This not only conserves the vitality of the jack but also enables the owner to breed a much larger number of mares. If care and precaution are taken, artificial breeding may be practiced with as much success as breeding in the natural way. In fact, some mares which do not conceive from natural service are successfully impregnated artificially. It is sometimes advisable to use a stallion for teasing purposes in order to conserve the jack when the patronage is heavy.

FEEDS FOR THE JACK.

The jack is a rather sluggish animal, and for this reason his feeds should be slightly laxative in character. Bran, oats, crushed barley, and oil meal are splendid grain feeds to use. Sheaf oats and green feeds are also very satisfactory. Corn should be used only in limited amounts. Many jack breeders obtain good results by feeding sheaf oats, clover, and alfalfa hay.

THE BROOD MARE.

Sound brood mares of good quality should be selected in order to be successful in producing high-grade mules. Considerable effort is usually expended by the breeders of work horses in selecting good mares for breeding purposes, but no consistent effort is usually made by the mule breeder in exercising the same care in selecting brood mares for the production of mules. The idea seems to prevail that

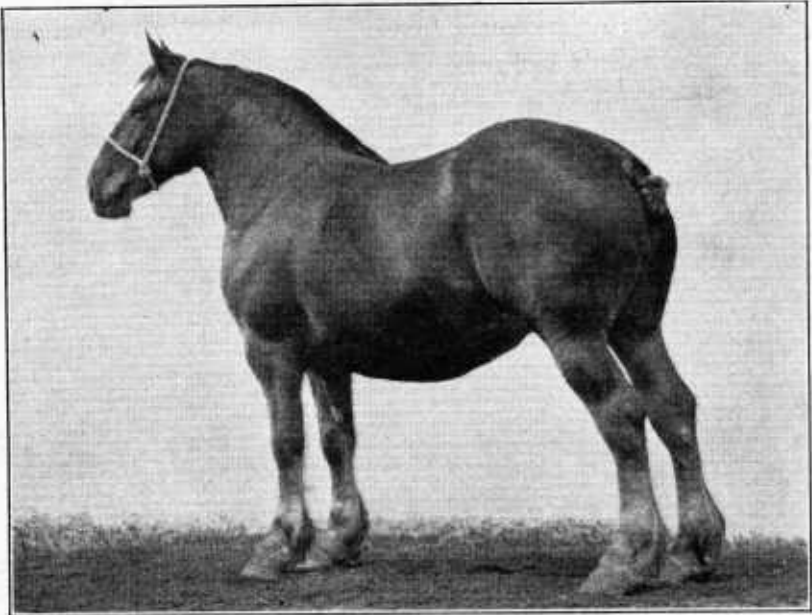


FIG. 4.—A desirable type of brood mare for producing draft mules. Note the "breediness," substance, and conformation of this mare.



FIG. 5.—A desirable type of light "mule mare" for producing mules of quality. Note roominess of body, short back, depth of heart girth, and "breediness" of this mare.

a mare which is not suitable for breeding to a stallion is good enough to produce a mule. This is a mistake, for no matter how good the jack may be, it is inconsistent to expect uniformly good mule colts from inferior mares. The same care should be applied in selecting mule mares as is exercised in selecting brood mares to raise horse colts. The mares used in mule production are of no fixed type or breed and vary from the large, heavy mares of the draft breeds to the smaller mares of the light-horse breeds (Figs. 4 and 5). As the mule is a work animal which can not reproduce its kind, it is not essential that mares for producing them be of any fixed breeding. Mules from the larger mares of the draft breeds are large and heavy and are excellent for draft purposes, but they are more sluggish and can not stand heat so well as mules produced from mares having light-horse blood in their veins. Experienced breeders state that a very desirable mule mare is one having about one-fourth draft blood. A mare of this breeding will produce good-sized mules, with style, action, and stamina. It seems that type rather than breeding is the prime requisite of a good mule mare.

In conformation the mule mare should possess all the good qualities desired in the brood mare used for producing good work horses. Some of the most important points of the good mule mare are:

A broad chest and large heart girth, indicating a vigorous constitution; a roomy barrel to allow for full development of the fetus; a straight back, strongly muscled over the loins; well-set legs with broad, flat bone, sound and of good quality; large and well-shaped feet; and feminine character, indicating "breediness." To sum up, the mare should combine size with quality, type, soundness, and breediness. The last term includes a variety of characteristics which makes the mare a good mother.

BREEDING THE MARE.

The mare will come in heat, on an average, every 18 to 21 days and will remain in heat from 2 to 4 days, though exceptional mares vary in this respect and remain in heat only a few hours. The mare usually comes in heat on the ninth day after the foal is dropped. In order to avoid accidents at breeding time, hobbles should always be put on the mare. Conception is more likely to take place if the mare is rested for a few hours at time of service. The mare should be returned to the jack in from 18 to 21 days after service, in order to make sure that conception has taken place.

Mule Production.

TABLE 1.—Calendar showing time of service and date of foaling based on 340-day gestation period for mares.

Day of month mare is bred.	Date of foaling.											
	Bred in Jan.	Bred in Feb.	Bred in Mar.	Bred in Apr.	Bred in May.	Bred in June.	Bred in July.	Bred in Aug.	Bred in Sept.	Bred in Oct.	Bred in Nov.	Bred in Dec.
	<i>Dec.</i>	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May.</i>	<i>June.</i>	<i>July.</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>
1.....	6	6	3	6	5	6	5	6	6	5	6	5
2.....	7	7	4	7	6	7	6	7	7	6	7	6
3.....	8	8	5	8	7	8	7	8	8	7	8	7
4.....	9	9	6	9	8	9	8	9	9	8	9	8
5.....	10	10	7	10	9	10	9	10	10	9	10	9
6.....	11	11	8	11	10	11	10	11	11	10	11	10
7.....	12	12	9	12	11	12	11	12	12	11	12	11
8.....	13	13	10	13	12	13	12	13	13	12	13	12
9.....	14	14	11	14	13	14	13	14	14	13	14	13
10.....	15	15	12	15	14	15	14	15	15	14	15	14
11.....	16	16	13	16	15	16	15	16	16	15	16	15
12.....	17	17	14	17	16	17	16	17	17	16	17	16
13.....	18	18	15	18	17	18	17	18	18	17	18	17
14.....	19	19	16	19	18	19	18	19	19	18	19	18
15.....	20	20	17	20	19	20	19	20	20	19	20	19
16.....	21	21	18	21	20	21	20	21	21	20	21	20
17.....	22	22	19	22	21	22	21	22	22	21	22	21
18.....	23	23	20	23	22	23	22	23	23	22	23	22
19.....	24	24	21	24	23	24	23	24	24	23	24	23
20.....	25	25	22	25	24	25	24	25	25	24	25	24
21.....	26	26	23	26	25	26	25	26	26	25	26	25
22.....	27	27	24	27	26	27	26	27	27	26	27	26
23.....	28	28	25	28	27	28	27	28	28	27	28	27
24.....	29	29	26	29	28	29	28	29	29	28	29	28
25.....	30	30	27	30	29	30	29	30	30	29	30	29
26.....	31	31	28	31	30	31	30	31	31	30	31	30
	<i>Jan.</i>	<i>Feb.</i>	<i>Mar.</i>	<i>Apr.</i>	<i>May.</i>	<i>June.</i>	<i>July.</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>	<i>Dec.</i>
27.....	1	1	1	1	1	1	1	1	1	1	1	1
28.....	2	2	2	2	2	2	2	2	2	2	2	2
29.....	3	3	3	3	3	3	3	3	3	3	3	3
30.....	4	4	4	4	4	4	4	4	4	4	4	4
31.....	5	5	5	5	5	5	5	5	5	5	5	5

CARE OF THE PREGNANT MARE.

There should be no sudden changes in feed or work of the mare after she becomes pregnant. She should be given a well-balanced ration of feed that will supply the needs of her own body as well as those of the growing fetus. Feeds that are too fattening should be avoided, also moldy or damaged hay, as there is a suspicion that either may cause abortion. Exercise is a most important essential to the health of the pregnant mare, as well as for the development of a strong, healthy foal. The best and most economical way of giving this exercise is by using the mare in regular farm work. The pregnant brood mare should not be subjected to hard pulls or severe strains. By using care and judgment the mare may be safely worked up to within a week or ten days of foaling. The average gestation period of mares—that is, the length of time that they carry their foals—is about 340 days. This period varies slightly with individual mares. It is important that a careful record be kept of the date of service to the jack in order that the time of foaling may be anticipated. A very sure sign that the foal will be dropped in a short while is the appearance of wax on the teats, which usually appears two or three days before parturition.

CARE OF MARE AT FOALING TIME.

About a week or ten days before the foal is expected the mare should be turned into a pasture or paddock, where there is no danger of injury from other animals. If the weather is mild, a paddock or pasture is a desirable place for the foal to be delivered. There is probably less danger of infection in a pasture than in a stable. If desirable conditions for foaling outside can not be provided for, a roomy box stall that has been well cleaned out, disinfected, and bedded with fresh straw should be provided.

It is well to observe the mare closely when the foal is expected, in order that assistance may be given in delivery if necessary. It will be necessary for the attendant to be where he can see the mare and yet be unseen by her. Should she need assistance, a veterinarian should be summoned at once. If it is essential that aid be given, the service should be rendered by one who has had experience with and understands the many phases of difficult parturition.

If the foal has been delivered satisfactorily, the attendant should remove as soon as possible any tissue or matter that may be clogging its nostrils and see that respiration is started. Assistance may be rendered in this respect by blowing into the foal's nostrils and rubbing its sides with a cloth or wisp of straw. As soon as practicable, without disturbing the mare unnecessarily, remove the afterbirth from the proximity of the mare and, if foaling occurred in a stable, clean out the bedding that has been soiled during parturition, sprinkle lime on the floor where the bedding has been removed, and supply fresh bedding.

To prevent infection, the navel cord of the foal should be saturated with full-strength tincture of iodine or a solution of 1 to 1,000 corrosive sublimate, and then dusted with powdered slaked lime. This should be repeated each day until the navel cord drops off. A normal foal will usually find its own way to the mare's udder soon after arrival. If, however, the foal is weak and unable to stand within two or three hours after birth, it should be assisted in getting its first meal. It is very important that the newborn foal get the first milk from its dam, which is a substance called colostrum. In addition to having the food properties so much needed by the newborn, the colostrum also has a purgative effect, which stimulates the action of the digestive tract in eliminating the fecal matter already collected during the period of gestation. If this fecal matter is not eliminated within 24 hours after the colt is born, a dose of castor oil (2 to 4 tablespoons) shaken well in milk should be given and repeated in three or four hours until the desired results are obtained.

CARE OF MARE AND FOAL.

The mare should receive bran mashes and light feeds until she has recovered from the effects of foaling and the feverish condition of her system has disappeared. The ration should then be increased gradually until the mare is on full feed.

When the weather is warm and pleasant, the mare and foal may be turned out on pasture or paddock as soon as the foal is able to follow, as exercise is very beneficial and they will thrive better in the open.

If the mare was being worked prior to foaling, she will be ready for work again in 10 days or two weeks after the colt is born. When this is done the colt should be confined in a stable or paddock and not permitted to follow in the fields. The mare and colt will fret for each other for a while, but they will soon become accustomed to separation. When working, the mare should be returned to the stable once in the forenoon and in the midafternoon to allow the colt to suckle. The mare should be allowed to cool before being turned in with the colt, as there is danger of causing the colt to have scours and other digestive troubles if the mare is overheated when nursing.

When the mare is idle during the fly season, it is best to keep her and her foal in a darkened stable in the day and turn them out on pasture at night. The mare should be fed some grain and hay, as grass alone will not supply the needs of her body and also provide a sufficient milk flow for the colt.

The colt usually begins to eat a small amount of grain at the age of three or four weeks. Oatmeal should be the first grain fed and bran may be added later. Best results in feeding grain to colts in the open are obtained by building a creep under which they may pass at all times and which will prevent the mares or other mature horses from reaching the feed provided for the colts. The colt will eat only a little grain at first, but it is worth much to have it begin eating a small amount as soon as possible, because the more accustomed it becomes to eating grain while young the less trouble there will be at weaning time. The mare may be induced to frequent the creep by giving her an occasional feed near there also.

WEANING THE COLT.

Under ordinary conditions the colt is usually weaned when about six months old, but if the mare is working and the colt is thrifty it may be weaned earlier. When the colt has been taught to eat grain early, this separation from its dam need not cause any check in the colt's development. This is a trying time in the life of a colt, however, and it should receive additional feed and care to make up for the loss of the mother's milk from its ration. When the colt is once taken away from the mare, the separation should be made complete.

The mare requires some individual attention at weaning time. It will be necessary to milk her by hand for a few days to prevent too much milk from collecting in the udder and causing it to become caked and swollen. To assist in the drying-up process, the mare should be milked only partially dry and if the milk flow is maintained the grain ration should be reduced for a few days.

CARE OF THE COLT AFTER WEANING.

At no time in the colt's life is pasture more important than at the time of weaning. On being taken away from its dam, the colt needs succulent feed and the best way of supplying this feed is by having a good pasture. Not only is a good pasture necessary for the development of the colt, but it is also necessary if the colt is to be raised in an economical manner. In addition to the pasture the colt should

receive liberal amounts of grain and hay. Half of its growth is made during its first year and it should have every advantage possible for its development. Colts like companionship and they do better if several are allowed to run together (Fig. 6).

THE ORPHAN COLT.

It may happen sometimes that the mare dies soon after foaling or fails to give milk enough for her foal. When either of these misfortunes occurs the colt must be raised by hand, which is a tedious undertaking but is worth while if done properly. As a feed for the orphan colt, the best and most practical substitute for mare's milk is cow's milk after it has been prepared to conform as nearly as possible



FIG. 6.—Mule foals like companionship. A group of weanlings on pasture.

in composition to the milk of the mare. This is done by selecting milk that is low in butterfat and diluting it with one part of fresh water for three parts of milk. Add a tablespoon of sugar and three or four tablespoons of limewater to a pint of this diluted milk and heat to body temperature. Give the foal about a half teacup of this prepared milk at first and at short intervals gradually increase the amount and the length of time between feeding periods as the foal develops. A bottle with a rubber nipple attached is the most convenient way to give milk to the orphan. As the foal suckles frequently in small amounts when following its dam, one should feed it frequently and thus conform as nearly to natural conditions as possible.

The utensils used in feeding the orphan foal should be kept scrupulously clean. This can be done by freely utilizing hot water and sunshine, both of which are enemies to germs that collect and thrive in milk containers.

SPRING OR FALL COLTS.

The climatic conditions and nature of the farm work determine largely whether it is best to have the colts come in the spring or in the fall.

The natural breeding season for mares is in the spring, which is the generally accepted time to have colts. There are, however, several advantages of having fall colts, especially in the South. The fall-born colt comes at a time when the mare can probably be more easily spared from farm work and at a time when flies are not so abundant. Another advantage is that the fall colt is weaned at a time when it can be turned on to pasture and its development is not retarded at this critical time. The spring colt is weaned at a time when the grazing season is practically over.

EDUCATING THE COLT.

The time to begin the education of the colt is early in its life. It should be halterbroken and taught to be led when a few weeks old. The more the colt is handled when young the fewer difficulties will be encountered later when it is desired to put him to work.

Mules reach maturity at the age of 5 years, but they may be given light work when 3 years old. Care should be taken not to overload young mules. Overtaxing the young animal not only tends to check its development but also causes it to become unreliable as a worker, and possibly balky. A young mule that becomes accustomed to moving a load every time it is called upon will develop into a reliable work animal.

FEEDING AND CARE OF MULES.

Too little thought and attention are usually given to the proper methods of management and feeding of mules. Where the use of mules as work stock prevails, the feeding is usually done in a haphazard manner without regard to efficiency and economy. The essentials of a good caretaker are judgment and common sense combined with some knowledge of feeds. The most practical feeds to use are those which are grown on the farm or plantation so far as they provide the essential nutrients for a balanced ration. Corn, oats, and barley are the most widely used grains, as there is hardly a section of the United States where one or more of these grains are not grown. These grains may be combined to make a satisfactory feed or taken singly and supplemented with such feeds as bran, oil meal, or cottonseed meal to make a balanced ration. A balanced ration is one which will supply the protein and carbohydrate elements in such proportion as to meet as nearly as possible the body requirements of the animal for doing the work which it is to perform.² The same principles that are used in the correct feeding of horses may also be applied to the feeding of mules. As a general rule 1.1 pounds of grain and 1½ pounds of hay daily per 100 pounds of live weight will be found to be about the right amount of feed to use for an animal at medium work. The exact

² Methods of computing a balanced ration are fully explained in Farmers' Bulletin 1030, Feeding Horses, which may be obtained on request from the Division of Publications, Department of Agriculture, Washington, D. C.

quantity of feed depends upon the individual animal and must be determined by the feeder.

While there are many cases in which mules are underfed, there are probably many others in which the owner suffers financially because the mules are fed more high-priced feeds than they really need, through the use of improperly balanced rations. Overfeeding is most likely to be done during the winter months, when the mules are idle. During this period idle mules may be kept in good condition largely on hay and straw and a small amount of grain. Mules that are worked hard and are receiving heavy rations should have their feed allowance diminished when idle. Idle mules thrive better if they are not confined in stables but are kept in the open.

Digestive disorders are more prevalent among work stock during the spring and summer months than at any other time. This is due to the improper feeding and watering of overheated animals. If the work animal appears to be excessively warm when brought in from work, it should be permitted to cool off before watering or feeding. Attention to such details will prevent many cases of colic. Mules sometimes suffer in hot weather from heat because they are allowed to eat too much grain or hay. This is most likely to occur when fresh, new hay is being fed. The hay ration should be fed mainly at night so that there will be several hours in which the mule may partly digest and assimilate this bulky feed before going to work.

Mules like to roll after being unharnessed, and they should have a place where they may rest themselves in this way. They will be much more comfortable in summer if they are turned out of their stables at night after they have cleaned up their feed. If they are turned on to pasture at night they will sweat more the next day, but the beneficial effects obtained from the grass and being in the open will more than offset the effects of excessive sweating. If unable to provide pasture for the mules at night during the summer, a paddock or lot should be provided where they may be comfortable.

JUDGING MULES.

The general form and appearance of the mule should resemble closely that of a horse, and in judging mules the same general points of perfection are looked for. The nearer the mule approaches the ideal desired in a draft horse the more valuable he is from a market standpoint. In the mule there are certain characteristics derived from his paternal side which are mainly indicated in his bray, disposition, ears, tail, and feet, aside from which the mule does not differ materially from the dam.

Mules vary in height from the little 12-hand pit mules to the large draft mules standing 17½ hands. The range in height of various classes of mules is given in another portion of this bulletin under "Market classes of mules."

The weight of mules varies from 600 pounds to 1,600 pounds. The average weight of the larger type of mules varies between 1,150 and 1,400 pounds and is the range of weight within which the majority of the most marketable mules are classified.

The form of the mule should be compact, with a deep body, broad chest, full flanks, short back, and well-sprung ribs. Light, waspy flanks, long narrow bodies, and long backs are not desirable.

Quality is rather difficult to define, but is that which every capable judge looks for in any animal. It is indicated in a mule by a trim, fine ear, clean-cut head and joints, flinty flat bone, well-defined tendons, and soft, silky hair. Quality marks the difference between a "market topper" and a "jar head." A short, thick ear, a coarse head, round, spongy bone, and a harsh coat of hair are indications which the judge should discriminate against.

The natural tendency of the mule is to be lazy and obstinate. An active, energetic mule is much desired.

It is in the hind quarters of the mule that the greatest faults of conformation are usually found. The croup is often very short

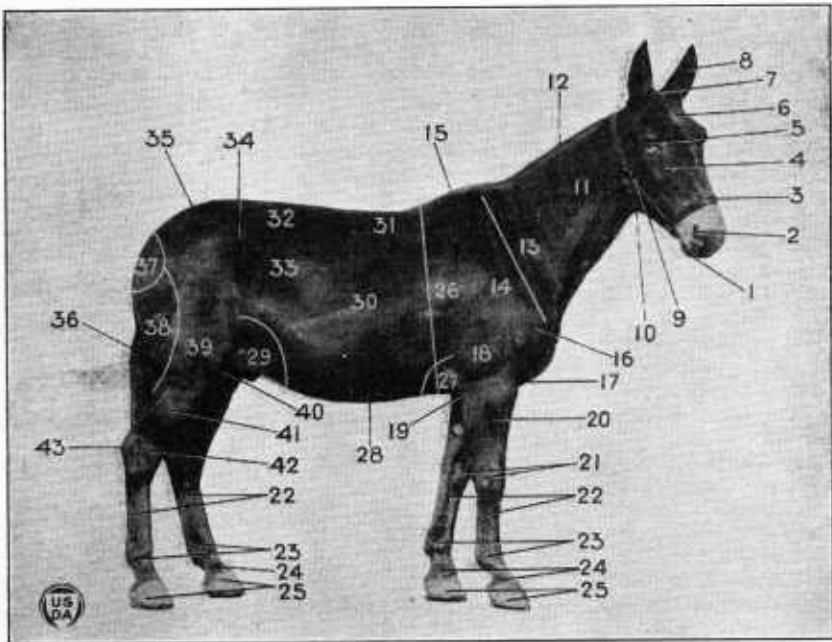


FIG. 7.—The points of the mule: 1, mouth; 2, nostril; 3, nose; 4, face; 5, eye; 6, forehead; 7, poll; 8, ear; 9, lower jaw; 10, throatlatch; 11, neck; 12, crest; 13, shoulder bed; 14, shoulder; 15, withers; 16, point of shoulder; 17, breast; 18, arm; 19, elbow; 20, forearm; 21, knees; 22, cannons; 23, fetlocks; 24, pasterns; 25, feet; 26, heart girth; 27, fore flank; 28, underline; 29, hind flank; 30, barrel; 31, back; 32, loin; 33, coupling; 34, hip; 35, croup; 36, tail; 37, buttock; 38, quarters; 39, thigh; 40, stifle; 41, gaskin; 42, hock; 43, point of hock.

and steep, the hips sloping, the thighs narrow, and the hind legs sickle shaped. These are faults of conformation that judges should discriminate against sharply. It is in the hind quarters and loins that the draft animal obtains propelling power. These portions of the animal, therefore, should be correctly built and properly developed. The loins should be broad, short, and thickly muscled; the croup long and level; the hips long, level, and muscular; the thighs thick,

long, and well muscled; and the hind legs well set, with broad, clean-cut hocks and flat, dense bone. The mule should stand on good feet that are well shaped.

While the mule is essentially a draft animal, it is used widely for general utility purposes, especially in the South. Though style and action may not be so important qualities in a mule as they are in the lighter breeds of horses, these qualities add materially to its value. A smart, alert mule, with a long, free stride at the walk and a snappy, balanced trot is highly desired. Figure 7 and the accompanying score card give points in the study of conformation.

Score Card for the Mule.

Scale of points.	Standard score.	Points given animal judged.	
		Student's score.	Corrected score.
GENERAL APPEARANCE—16 points:			
<i>Height</i> —Estimated hands....; actual hands.....			
<i>Weight</i> —Estimated....; actual....; according to age and type....	4		
<i>Form</i> —Broad, deep, compact, smooth, symmetrical.....	4		
<i>Quality</i> —Clean, dense bone with sufficient substance; refined head and ears; fine hair; defined joints and tendons.....	4		
<i>Temperament</i> —Active; good disposition.....	4		
HEAD AND NECK—7 points:			
<i>Head</i> —Proportionate; clear-cut features.....	1		
<i>Forehead</i> —Broad, full.....	1		
<i>Eyes</i> —Full, bright, clear.....	1		
<i>Muzzle</i> —Broad, fine; large nostrils; trim and even lips.....	1		
<i>Ears</i> —Large, long, pointed, fine, well set, carried alert.....	1		
<i>Neck</i> —Long, muscular, clean-cut throatlatch.....	2		
FOREHAND—24 points:			
<i>Shoulders</i> —Long, sloping, smooth, muscular, blending into smooth, well-defined withers.....	3		
<i>Arms</i> —Short, muscular, elbow in.....	1		
<i>Forearms</i> —Long, wide, muscular.....	2		
<i>Knees</i> —Straight, wide, deep, well supported.....	2		
<i>Cannons</i> —Short, wide, flat, well-defined tendons.....	2		
<i>Fetlocks</i> —Wide, straight, tendons well back, well supported.....	1		
<i>Pasterns</i> —Of medium length, oblique (about 45°), clean, strong.....	3		
<i>Feet</i> —Of medium size, set straight; dense, smooth horn; slope of wall parallel to pastern; wide, high heels; concave sole; strong bars; prominent, elastic frog.....	6		
<i>Leg position</i> —In front, a perpendicular line from point of shoulder should divide the leg and foot into lateral halves; from the side, a similar line from the bony prominence on shoulder blade should pass through the center of elbow, knee, and pastern joints, and meet the ground back of foot.....	4		
BODY—9 points:			
<i>Chest</i> —Deep, wide.....	2		
<i>Ribs</i> —Long, well sprung, close.....	2		
<i>Back</i> —Short, broad, strong.....	2		
<i>Loin</i> —Short, wide, muscular.....	2		
<i>Flanks</i> —Deep, full; long, low underline.....	1		

Score Card for the Mule—Continued.

Scale of points.	Standard score.	Points given animal judged.	
		Student's score.	Corrected score.
HIND QUARTERS—32 points:			
<i>Hips</i> —Wide, level, smooth, muscular.....	2		
<i>Croup</i> —Long, level, muscular.....	2		
<i>Tail</i> —Set high, well carried.....	1		
<i>Quarters and thighs</i> —Deep and muscular; strongly joined to gaskins.	3		
<i>Stifles</i> —Broad, thick, strong.....	1		
<i>Gaskins</i> —(Lower thighs) long, wide, muscular.....	2		
<i>Hocks</i> —Straight, wide, prominent points, deep, flat, clean-cut, well supported.....	6		
<i>Cannons</i> —Similar to front, but a trifle longer and wider.....	2		
<i>Fetlocks</i> —Wide, straight, tendons well back.....	2		
<i>Pasterns</i> —Similar to front, but less sloping (about 55°).....	3		
<i>Feet</i> —Similar to front, but not quite as large.....	4		
<i>Leg position</i> —From rear, a perpendicular line from point of buttock should divide the leg and foot into lateral halves; from the side, this same line should touch the point of hock and run parallel to the cannon. A similar line from hip joint should meet the ground midway between heel and toe.....	4		
ACTION—12 points:			
<i>Walk</i> —Active, straight, balanced, long stride.....	7		
<i>Trot</i> —Straight, long, free, regular, snappy stride.....	5		
Total.....	100		

MARKET CLASSES OF MULES.

Mules are classified according to their use. There are many local market classifications of mules, but they may be grouped into five general classes. Each class includes mules of a general type, while there are various grades and weights within a specific class.

The general classes of mules are shown in the table.

TABLE 2.—Ranges in height and weight of various classes of mules.*

Class.	Range in height.	Range in weight.
	<i>Hands.</i>	<i>Pounds.</i>
Draft.....	16 to 17½	1,200 to 1,600
Farm.....	15½ to 16	900 to 1,250
Sugar.....	16 to 17	1,150 to 1,300
Cotton.....	13½ to 15½	750 to 1,100
Mining.....	12 to 16	600 to 1,350

Each of the classes is graded according to conformation, soundness, quality, condition, and action into the following grades: Choice, good, medium, common, inferior.

* Market Classes and Grades of Horses and Mules. Bulletin 122, Illinois Agricultural Experiment Station, 2d ed. 1912.

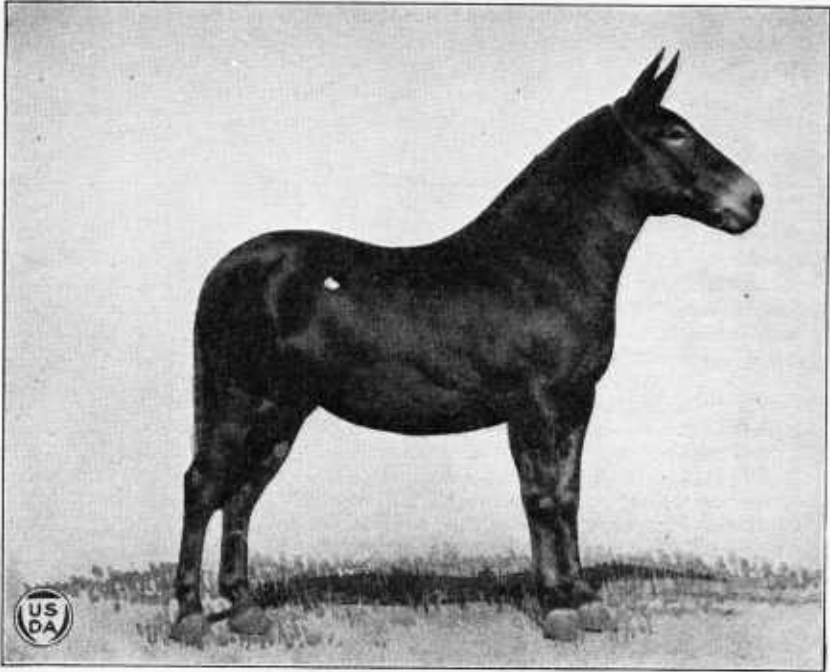


FIG. 8.—A choice draft mule. Champion mule at American Royal Livestock Show, Kansas City, Mo., 1922.

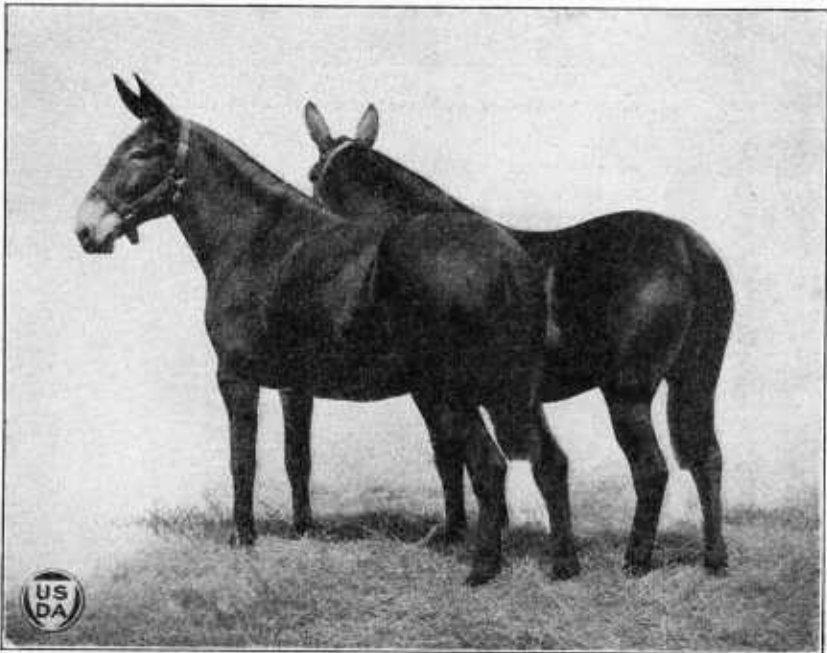


FIG. 9.—A pair of choice draft mules.

DRAFT MULES.

The draft-mule class includes the largest mules (Figs. 8, 9, 10), standing from 16 to 17½ hands and weighing from 1,200 to 1,600 pounds. Some exceptional draft mules exceed the maximum weight given for this class. They are used largely for heavy teaming in large cities, especially in the warmer climates; for contract jobs, such as road grading and railroad work; and for lumber work. Mules for contract work are usually designated by an appropriate descriptive name, such, for instance, as "railroaders." The heaviest draft mules find their way to the lumber camps. Contract mules

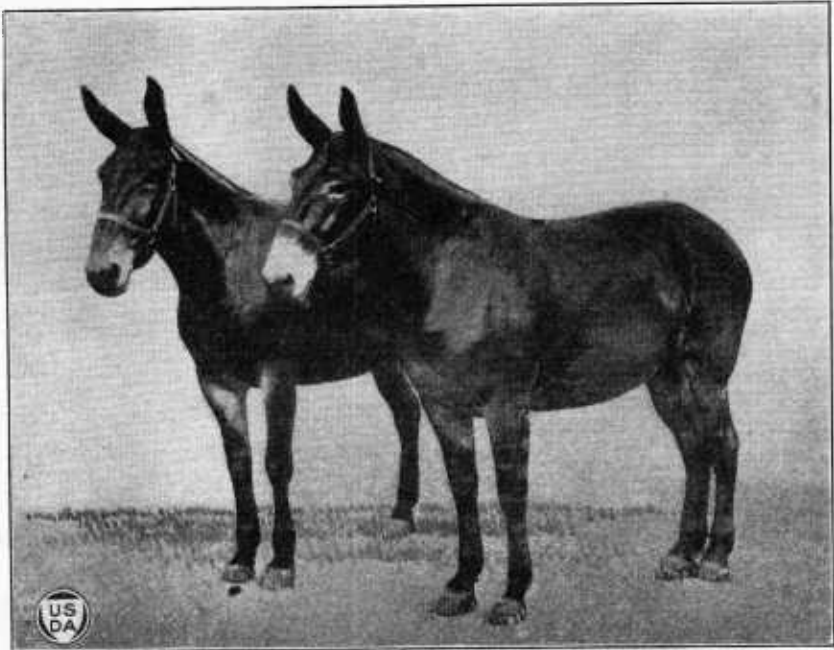


FIG. 10.—A pair of good draft mules.

must have more quality than lumber mules, but extreme weight is not so essential. The greatest demand for draft mules is for those between the ages of 5 and 8 years.

There is no special preference in regard to sex. The highest prices paid are for those mules having weight combined with heavy bone, large, well-shaped feet, strong, short backs, closely coupled with abundant muscling over the loin and hind quarters.

FARM MULES.

Mules purchased in the market for farm work in the Middle Western States are known as "farm mules." There is more variation in quality and type in this class than in any other class, as the demand for a specific type is not so well defined (Figs. 11, 12, 13, 14).



FIG. 11.—A pair of large farm mules.

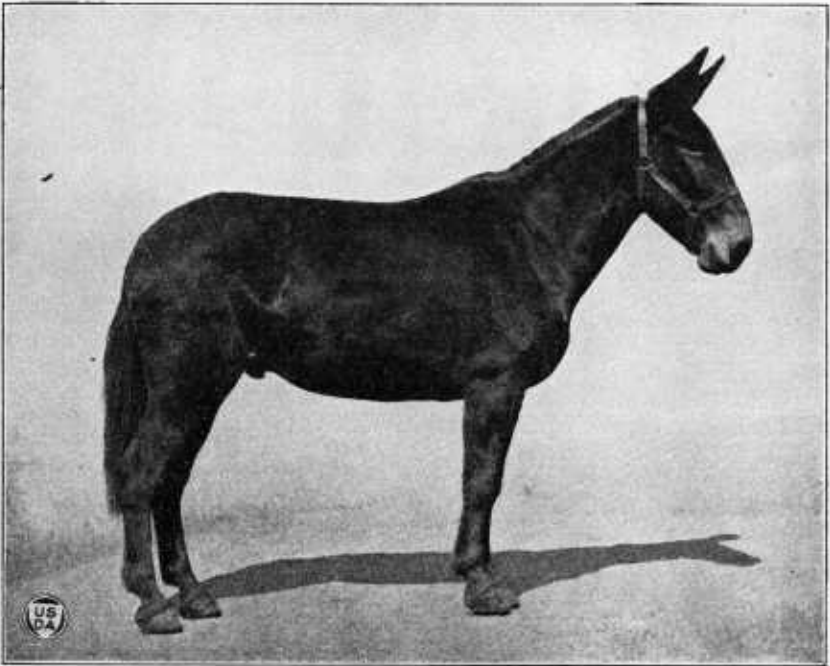


FIG. 12.—A good farm mule.

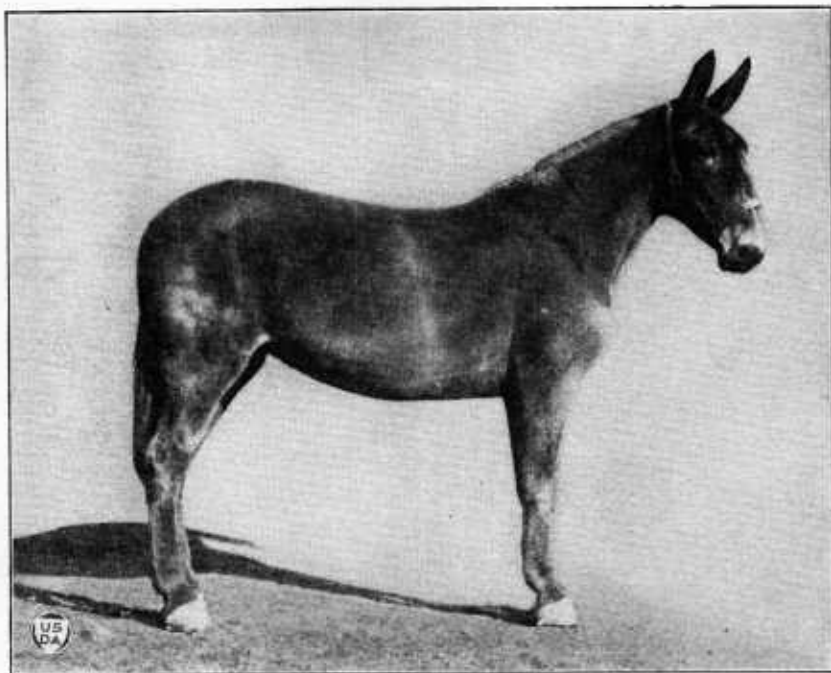


FIG. 13.—A medium farm mule.

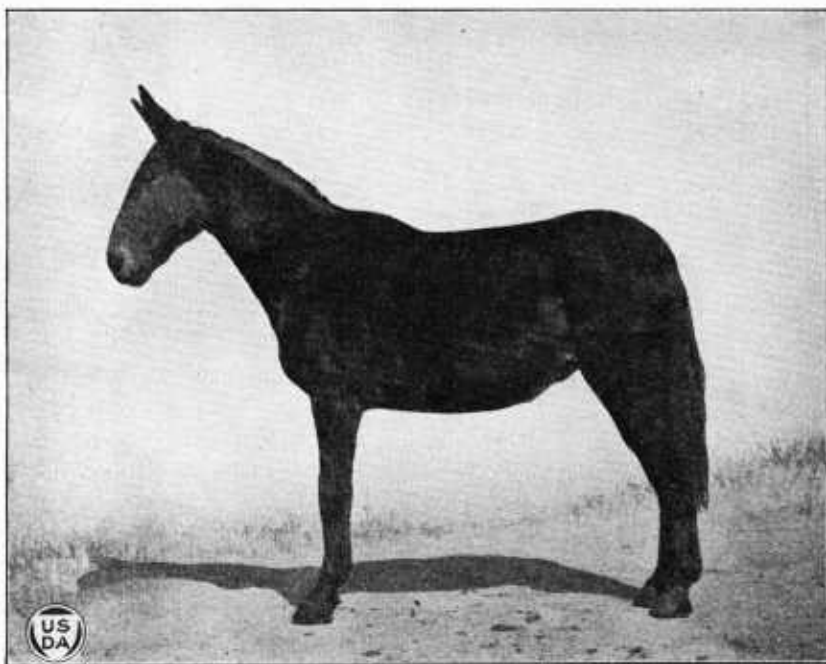


FIG. 14.—Common farm mule.

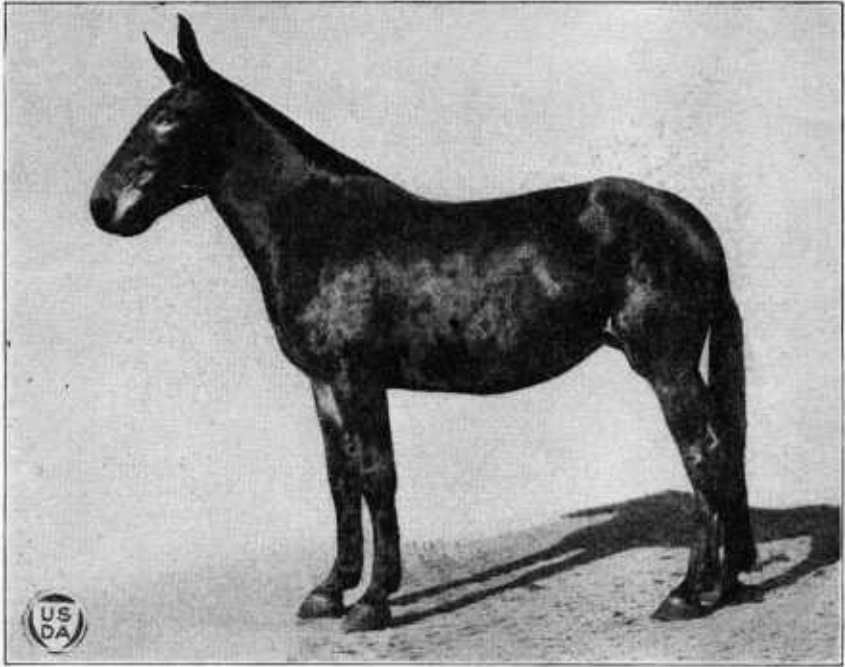


FIG. 15.—A choice sugar mule.



FIG. 16.—A good sugar mule.

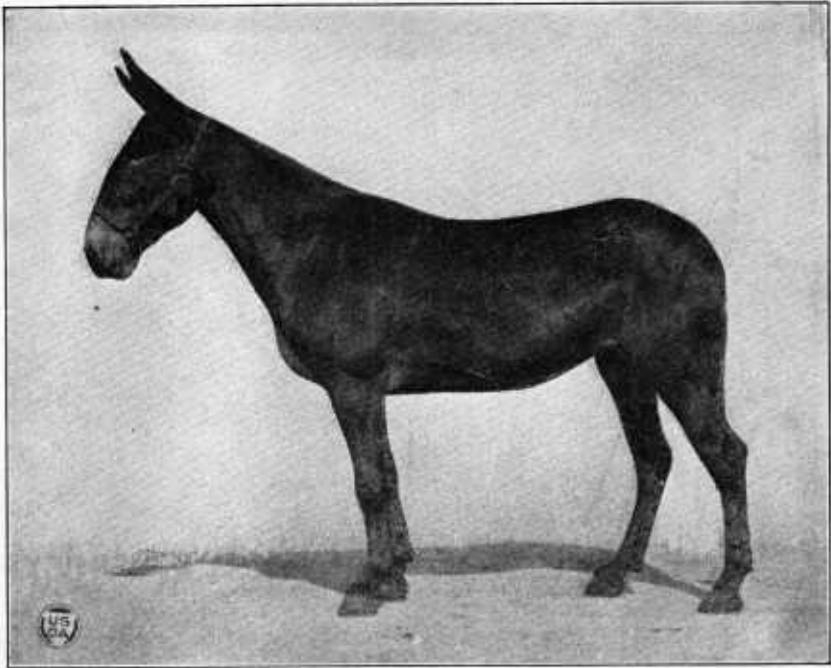


FIG. 17.—Common sugar mule.

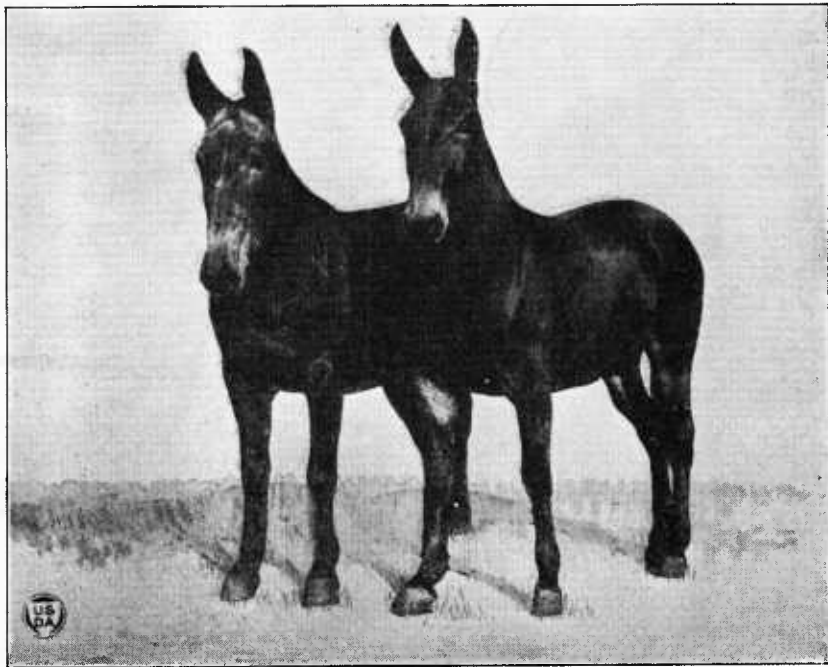


FIG. 18.—A team of choice cotton mules.

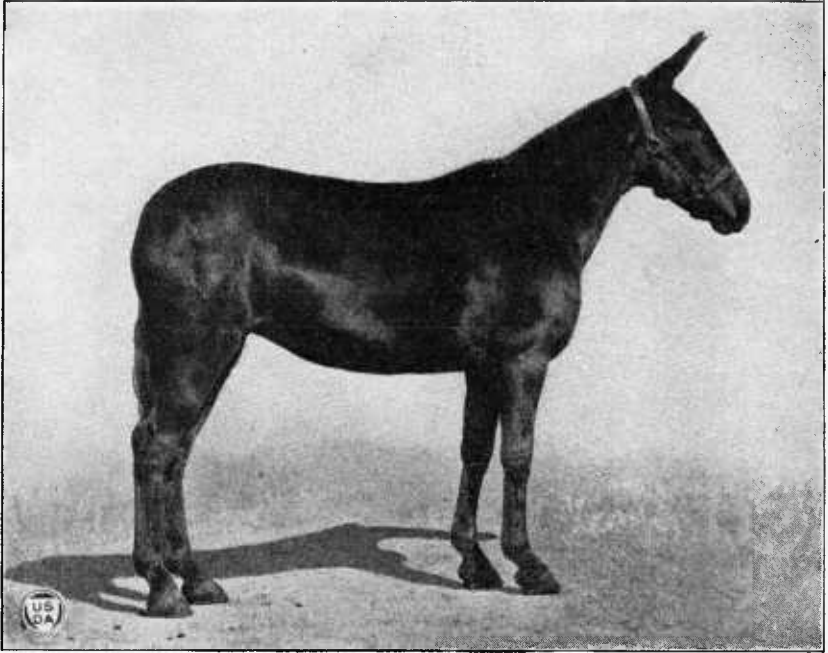


FIG. 19.—A good cotton mule.

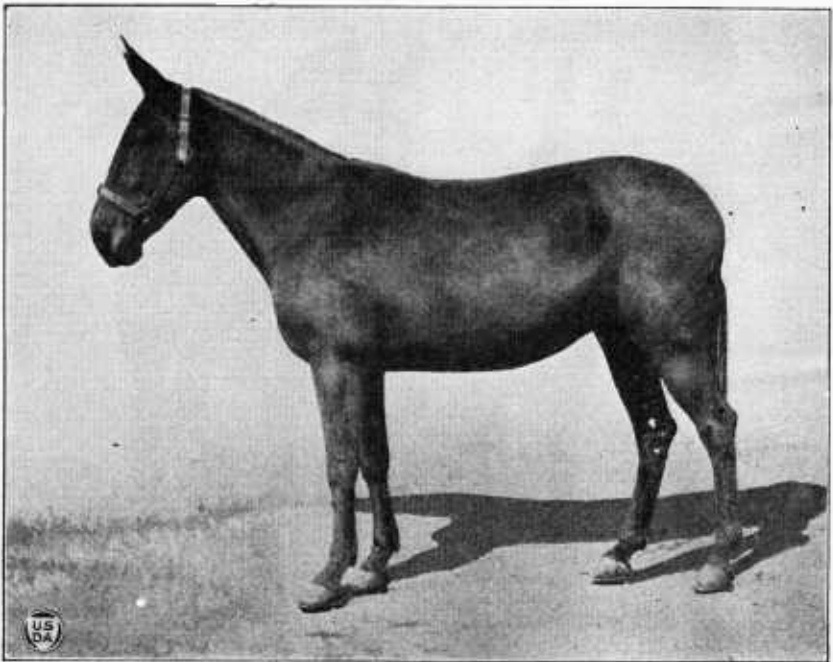


FIG. 20.—A medium cotton mule.

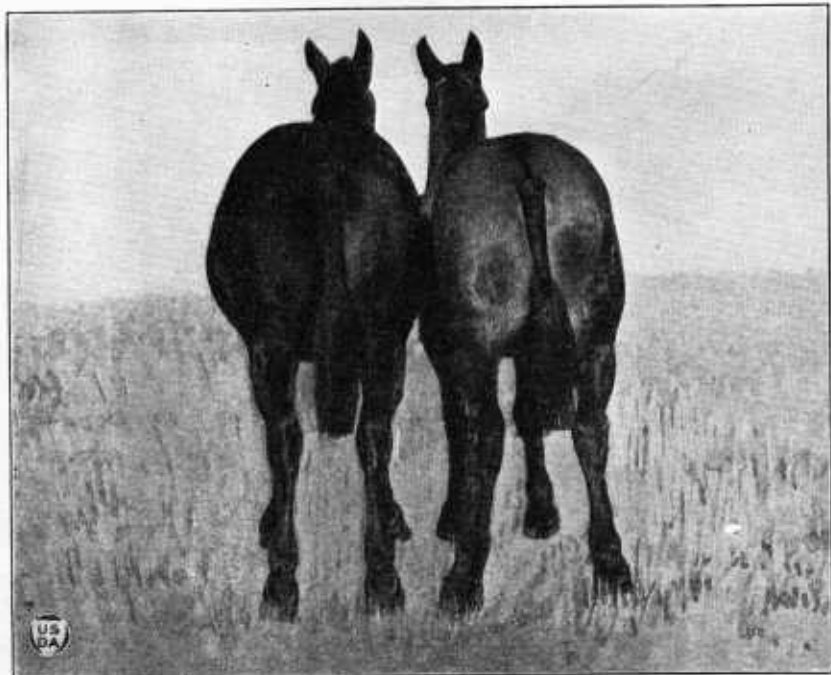


FIG. 21.—A team of choice surface mining mules.

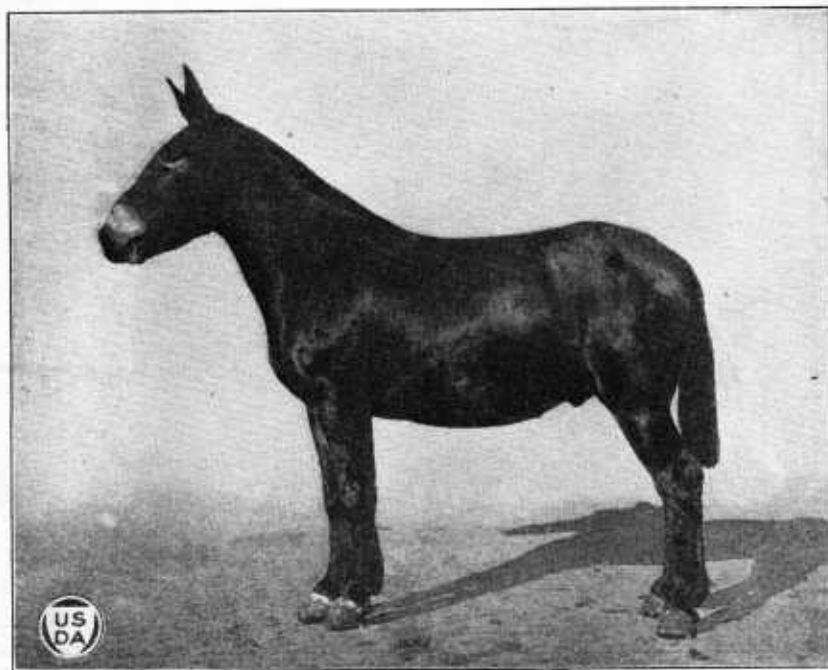


FIG. 22.—A choice surface mining mule.



FIG. 23.—A choice pit mining mule.

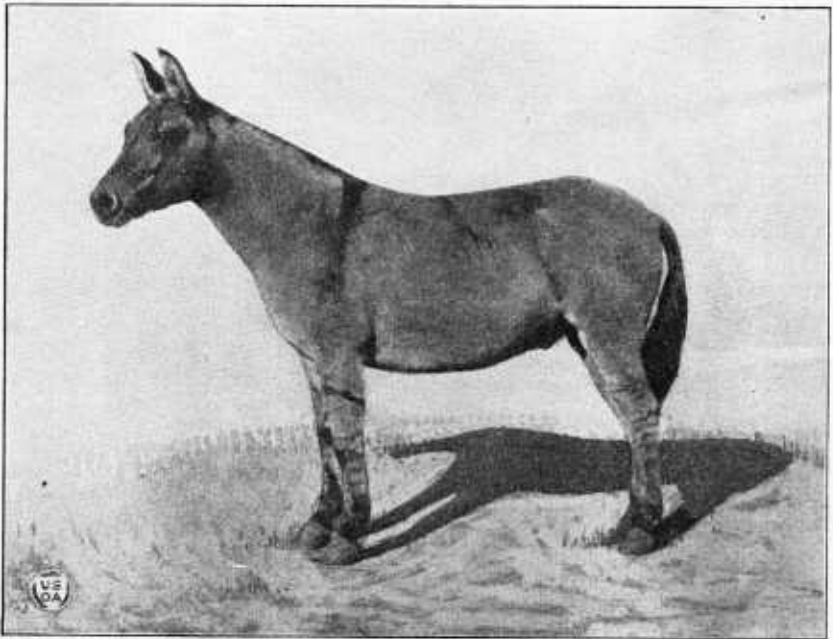


FIG. 24.—A good pit mining mule.

Mules in this class may be plain draft mules or cotton mules that lack finish and condition, as the farmer likes to buy mules with a prospect of developing them into more valuable animals. Many of them are worked for a season and then fitted for the market, where they are placed into one of the other specific classes, such as "drafters," "sugar mules," "cotton mules," "miners," or "railroaders."

SUGAR MULES.

Sugar mules are those which are purchased for shipment to the sugar plantations of the South. This class of mules is somewhat rangy in type and should have quality, style, and finish. The mules in this class are heavier and more compact than cotton mules, but not so heavy as draft mules. The range in weight is from 1,150 to 1,300 pounds. In selecting sugar mules special attention should be given to quality and adaptability to the work. The feet should be large and well shaped. Mare mules are preferred for the sugar trade (Figs. 15, 16, 17).

COTTON MULES.

As the name implies, cotton mules are purchased for cotton plantations. The type (Figs. 18, 19, 20) is somewhat lighter and more angular than the sugar or surface-mining mule and heavier than the pit mule. While there is a gradation of quality and age in this market class, the planters of the South are becoming more and more inclined to increased weight and quality in their mules than prevailed a few years ago. A choice cotton mule weighs about 1,150 pounds and is alert and active, but most mules in this class vary from 750 to 1,100 pounds. The custom in the Cotton Belt is to buy mules in the spring for the crop season and dispose of them in the fall. As they are usually in poor condition following the heavy summer's work, they are sold in the fall for a fraction of the purchase price. These mules are wintered, fattened, and sold back to the planter in the spring. For this reason the age limits within this class are variable. Mules from 5 to 7 years old are preferred, however, for this trade and bring the best prices.

MINING MULES.

There is a wide range in weight among mining mules, varying from 600-pound pit mules to 1,350-pound surface mules (Figs. 21, 22, 23, 24). Good feet and freedom from blemishes are requirements for mules to qualify for top prices for the mining trade.

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